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THE FALL ELECTRICAL TRADE AND LIGHTING NUMBER.

This is a time of the year when practically everyone engaged in the electrical industry is interested in two mutually interdependent subjects. Summer is on the wane, the vacation period is about over, shorter hours of daylight make the subject of electric lighting of prime importance.

The systems of lighting are here. So great have been the improvements in the sources of illumination, and to such a high degree have efficiencies been carried, that it becomes a question of analysis of the conditions to be served and determination of the various factors of economy, stability of service and facility of operation. The electrical engineer today can come pretty near to deciding upon exactly that system of electrical illumination that will best meet all of the requirements of any installation.

Is the time with regard to conditions of business right for an expectation of large increase in the utilization of electrical sources of illumination? Is the time right for the rehabilitation of old systems, for the extension of the present equipment and for the installation of new material?

To make available as complete a review of the present status of the art of illumination and to answer as far as is humanly practicable the question as to present conditions, the "Fall Electrical Trade and Lighting Number" of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN has been prepared.

The leading manufacturers of electrical illuminating apparatus and materials have contributed an up-to-the minute study of the objects and results of their investigations and development. Many well known leaders in the manufacture of electrical material of every description and equally prominent distributors have contributed their opinions regarding the outlook.

Realizing how closely the prosperity of the electrical industry is bound up in the prosperity of other industries, we have invited the editors of the leading trade publications of the country to discuss the conditions of business obtaining in their various industries, with a forecast of the probable demand of these industries for

the utilization of electrical energy and electrical apparatus and supplies.

The human interest indicated in these messages from the manufacturers and jobbers, and the wealth of information revealed by the editors of the trade journals, we venture to believe, will make this issue of value to our readers. We commend to their thoughtful consideration all that is presented herewith.

We gratefully acknowledge the invaluable assistance that has been given to us in the preparation of this material, and we trust that the expressions of optimism running through each contribution may be shortly reflected in a material improvement in activities. If there is a realization of only a part of the opportunities apparently at hand, the murmurings of better business will grow into a riot of sound, and the country will awake to the bugle call of a new prosperity.

AMERICAN ELECTRICAL EXPORTS DURING THE FIRST YEAR OF THE WAR.

The world-wide upheaval in financial, commercial and industrial circles resulting from the gigantic European war has had many curious effects on international trade. While the most marked, of course, has been the almost complete cessation of exports by Germany, Austria and Turkey, there has also been a shrinkage in the foreign commerce of their opponents, an increase in the trade of several neutral countries, and a decrease in imports of nearly all the nations of the globe.

To us most interest attaches to the effect on the foreign trade of our country. An accurate measure of the war's influence on this is obtainable from a study of the Government report on our foreign commerce for the fiscal year ended June 30 last, which includes the first eleven months, or practically the first year, of the war. The most striking fact brought out by this report is that our total exports of domestic and foreign merchandise reached the highest value ever attained in any preceding fiscal year, amounting to $2,768,589,340, or over 12 per cent above the record established in 1912-1913. At the same time the total imports amounted to $1,674,169,740, or over 11 per cent less than the record total of the preceding fiscal year.

While the electrical exports, as shown in detail on another page of this issue, show a decrease in total value as compared with the two preceding years, the reasons for this are easily understood. The monthly totals in the early months of 1914 reflected an almost world-wide depression in foreign trade which culminated in August with the breaking out of the war and made the electrical total of that month the lowest for several years. Since that time there has been a gradual picking up in electrical shipments, April and June each showing totals of over $2,000,000, and the June total being an increase of more than 40 per cent over that of the preceding year. This improvement is due chiefly to shipments of electrical war supplies, and partly to the fact that supplies of electrical materials are becoming exhausted in countries that formerly imported them chiefly from the belligerents.

Although the total value of the electrical exports reported for 1914-1915 was about 21 per cent below that of 1913-1914, in the case of some individual classes there was an increase. This was notable with metal-filament lamps, which increased over 115 per cent; batteries also increased over 41 per cent. The comparative monthly figures, of course, show fluctuations in both directions of all the electrical classes, but it is noteworthy that in the case of insulated wires and cables there has been a decided increase each month since last March over the corresponding period of a year ago. This total increase for the last four months of the fiscal year was about three-fourths of a million dollars or 185 per cent.

A large part of these increases are due to exceptionally heavy shipments to the entente allies. How long these will continue is problematical, depending chiefly on the continuence of the war. As was pointed out in these columns recently, electrical shipments, like those of so many other classes of merchandise, are still considerably below normal to most of the neutral countries. However, hopes of future improvements in shipments to these countries are natural, because it is reasonable to expect that the agitation for the extension of our foreign trade which is being taken up co-operatively by our governmental and commercial agencies is to bear fruit in a steadily increasing measure.

RECENT PROGESS IN MAGNETISM.

Magnetic phenomena have for many years defied to a large extent the efforts of research students to determine their fundamental nature. Most of the experiments which have been made indicated that magnetic properties depended not upon the atoms of which any body was composed, but rather upon the molecules or groups of molecules. There are several reasons for this point of view. In the first place alloys composed of non-magnetic elements, such as the Heusler alloys, may exhibit magnetic properties. In the second place other alloys of magnetic elements, such as one of the nickel-steel alloys, may be non-magnetic.

A recent experiment performed by Compton and Trousdale at Reed College presents reasons for a different point of view. This view is based upon experiments made upon crystals of magnetite and hematite by the aid of X-rays. In the issue of December 5, 1914, we called attention to the work of Bragg and others in examining crystal structure by the aid of X-rays. When this method is applied to the magnetic minerals just mentioned, in the magnetized and unmagnetized state, it transpires that there is no relative motion of the atoms in changing from one condition to the other. If magnetism were a moleculer phenomenon it would be expected that the molecules or groups of molecules would change their orientation under the influence of a magnetic field. Since this

does not appear to take place in the present experiment, it has been concluded that the magnetic properties of these substances must depend upon the individual atoms rather than upon the molecules or groups of molecules.

Other experiments, however, in addition to those mentioned above, seem to conflict with this conclusion. An alloy of iron and cobalt has been found which is more magnetic than pure iron and this would not be expected if the property were an atomic one.

The experiments of Weiss and his deductions therefrom indicate that complete magnetic saturation cannot be achieved except at the absolute zero of temperature and he was thus lead to undertake experiments at exceedingly low temperatures in co-operation with Onnes. If the magnetic properties are atomic in their nature rather than molecular it is not easy to see why temperature should have the effect which it is known to have. Years ago Curie showed that the co-efficient of magnetization is inversely proportional to the absolute temperature.

Experiments of Weiss indicate, moreover, that at least a group of atoms must be involved in magnetic phenomena and that in certain substances they seem to be rigidly bound together, whereas in others they may have independent motion.

Experiments described by Righi in Italy last winter serve to amplify the electron theory as applied to metals and to explain the action of a magnetic field as applied in the ordinary electric motor. Righi showed that if an evacuated glass vessel be subjected to a magnetic field and the residual gas ionized, the bombardment of the ions would set in rotation a delicately mounted rotor whose axis was parallel to that of the field. This is due to the fact that the electrified ions describe helical paths in a uniform magnetic field. The direction of the motion would depend upon the electrification of the ion. If the rotor is made one of the electrodes the effect of one set of ions may be observed alone and the effect may be much augmented.

By making the wall of the inclosure itself constitute the rotor, conditions are made analogous to the case of a metallic conductor in which electrons are imagined to be circulating. In a magnetic field these electrons would describe motions similar to those of the ions above mentioned and rotation of the conductor would result in a similar way. Thus the torque produced by a magnetic field acting upon a current-carrying conductor is explained upon the basis of the electron theory, an achievement which had not been possible before.

An experiment which is almost the converse of this has been carried out by Barnett. He has demonstrated that a steel rod when rotated experiences magnetization, the strength of the magnetizing field being proportional to the angular velocity. While this result was forecasted some years ago, it was not until the past year that definite results of this kind were obtained.

COMPETITION IN RURAL DISTRICTS.

There is hardly a central-station manager, at least among the smaller companies, who does not clearly remember the keen competition encountered from the small gasoline engine. Even today, despite efforts of enthusiastic motor and power salesmen, the gasoline engine has not been entirely replaced although the inherent advantages of the electric drive with central-station service are seldom questioned.

Such competition is, however, rapidly diminishing principally because of the activities of the power companies in purchasing the engines from prospective motor users, especially where the question of resale value of the old equipment enters into the transaction Usually the central station disposes of the gasoline engines, obtained in this manner, to the farmers in the vicinity without difficulty.

It may be premature to state that this practice simply results in removing competition in one direction and establishing it more firmly in another, but this has been the experience in at least a few instances. It is not difficult to dispose of really serviceable gasoline engines to the farmers. They are fast appreciating the advantages of power-driven farm equipment and in the household also are depending largely on gasoline engines or electric motors for the performance of the numerous operations in rural districts.

Central-station companies are practically all agreed that the extension of lines to serve rural customers is inevitable. As the saturation point is reached in the urban communities it will be necessary to look to the outlying districts for a large share of business in the future. At the present time, however, it is difficult to decide upon a consistent policy in regard to line extensions that will insure the utility a fair return on the investment, at the same time offering the customer continuous service at a price he can afford to pay.

Who shall pay the first cost of the line? Shall energy be metered on primary or secondary side? What voltage shall be used? What system of billing and collecting shall be employed? These are much mooted questions which are being deeply pondered by central-station managers, and in the meantime the farmers are clamoring for service.

It would, of course, be idle to urge central stations to build lines to serve farmers at a loss simply to prevent the installation of competing equipment but a situation, for which the utility companies are largely responsible, is arising which will work serious hardships on them in the future.

There are many phases to the question of serving farmers but none that is impossible of solution. In order to hasten the extension of lines to the rural communities, some sacrifices may have to be made, but on the other hand, the substitution of other power agencies for electrical energy and motor equipment in fields where eventually business for the latter will be solicited, is sufficient justification for any immediate reasonable loss.

Electrical Exports for June and for the Fiscal Year 1914-1915.

From the official monthly report on the foreign commerce of the United States, issued by the Bureau of Foreign and Domestic Commerce, are obtained the following data on the electrical exports for last June and for the fiscal year ended June 30, 1915.

For the four classes for which the number of electrical articles shipped is reported, there were exported in June the following: Electrical fans, 3,781; arc lamps, 137; carbon-filament lamps, 74,689; metal-filament lamps, 385,773. The following table gives the detailed figures for the several electrical classes reported for last June and for the corresponding month of a year ago:

Articles	June, 1915	June, 1914
Batteries	$ 113,950	$ 58,521
Dynamos and generators	191,464	199,955
Fans	48,106	22,717
Insulated wire and cables	253,247	74,294
Interior wiring supplies, etc. (including fixtures)	70,915	51,354
Lamps—		
Arc	1,826	3,952
Carbon-filament	11,432	3,094
Metal-filament	78,536	15,719
Meters and other measuring instruments	41,214	.....
Motors	283,923	231,003
Static transformers	70,543	75,392
Telegraph instruments (including wireless apparatus)	1,522	26,962
Telephones	44,342	69,717
All others	836,061	617,757
Total	$2,047,081	$1,450,437

The above total for June, 1915, exceeds that of June, 1914, by over 41 per cent.

For the 12 months of the fiscal year ended last June the electrical-export totals were as follows:

Month	Electrical Exports
July, 1914	$1,415,360
August, 1914	1,024,010
September, 1914	1,548,468
October, 1914	1,494,792
November, 1914	1,644,723
December, 1914	1,620,563
January, 1915	1,773,938
February, 1915	1,683,567
March, 1915	1,661,671
April, 1915	2,055,375
May, 1915	1,802,209
June, 1915	2,047,081

In the following table are given the electrical totals for the fiscal years since 1908-1909, when the last electrical-export depression reached its lowest point:

Fiscal Year	Electrical Exports
1908-1909	$12,524,391
1909-1910	14,742,395
1910-1911	18,727,455
1911-1912	20,169,362
1912-1913	26,772,816
1913-1914	25,060,844
1914-1915	19,771,757

Directors of Associated Manufacturers of Electrical Supplies to Meet.

A meeting of the board of governors of the Associated Manufacturers of Electrical Supplies, 62 Cedar Street, New York City, will be held at the Hotel Biltmore, New York, on the evening of September 9, at eight o'clock.

Louisville Electrical Interests Working for Electrical Prosperity Week.

Leading members of the Louisville electrical fraternity are working right ahead on their preparations for Electrical Prosperity Week, and are meeting at least once each week at luncheon meetings to discuss projects as they develop in this connection. It is stated that the plans are becoming more and more elaborate as they develop, and that everything points to a big occasion during the latter part of November and the first of December. The intention is to embrace everybody and every interest in the city, so far as they can be prevailed upon, in the celebration of the occasion.

Louisville's Jovians also are discussing the matter of an exhibition at the State Fair. Some time ago it was suggested that arrangements be made for establishment of a permanent electrical hall at the permanent grounds, which are in Louisville, and the movement was set going in a modest way. It became evident, however, that success was not in view this year, and the plans now are to wait until after the present fair, and then work for establishment of the electrical hall next year.

Plans Perfected for New England Section, N. E. L. A., Convention.

The seventh annual convention of the New England Section, National Electric Light Association, at Mt. Kineo, Maine, September 14-17, promises to be one of the most valuable and interesting to date. A large number will leave Boston at 8 a. m., September 14.

The features of power installations in large mills and relation of regulating commissions to the central-station industry will have the fore, and it is expected that several leading manufacturers, members of public service commissions of all the New England states and the Governor of Maine will be present. The discussion of the mill power question by the manufacturers themselves is an interesting innovation. Representatives of the United Shoe Machinery Company and the Arlington Mills, Lawrence, Mass., are booked to speak. In addition, Messrs. Applegate, of the Hartford Company; Arthur, of the Boston Edison; Gray, of the Narragansett Company; Harriman, of the Connecticut River hydroelectric companies; Spike, of Cambridge; West, of the Tenney Company, and Eells, of Augusta, will present the central-station side.

Renting of motors for factory use, and standardizing of voltages for mill service will be presented by G. F. Parsons, of C. D. Parker & Company, Boston, and D. M. De Bard, of the Brockton Edison Company.

Electrical Prosperity Week will be forecasted by Manager J. M. Wakeman of the Society for Electrical Development; a report on electric-vehicle progress will be rendered by E. S. Mansfield, of Boston; a joint report on co-operation between central stations and contractors will be presented by W. L. Mulligan, of Springfield, and developments in type C Mazda lamps will be described by H. Schroeder, of the Edison Lamp Works, and C. A. Dean, of the Cambridge company. The election of officers and other business occurs on Friday morning, September 17.

President E. W. Lloyd, of the National Electric Light Association, will attend a part of the convention.

Sporting events will include golf, tennis and mountain climbing. Several manufacturers have donated prizes to winners in a tennis tournament. Other prizes may also be offered.

List of New Radio Stations Announced.

The Bureau of Navigation of the United States Department of Commerce announces a list of six additions made to the land stations of the country in the radio service and 16 additional ship stations, since its last bulletin on the subject was issued. Of the land stations, the one of longest range is at Tolovana, Alaska, which has a normal reach of 300 nautical miles. The station is located in longitude 149:30 west and latitude 65 north; the wave lengths are 300 and 600 meters, the latter normal, and the system is Telefunken, with 1,000 sparks per second. It is operated by the Alaska Wireless Telegraph Company.

Of the new ship stations, the largest are the Ossipee and Tallapoosa, each operated and controlled by the United States Coast Guard, Treasury Department, with range of 300 miles, and the Roosevelt, operated and controlled by the Bureau of Fisheries of the Department of Commerce, with a similar range.

Historic Harrison Street Station in Chicago to Be Dismantled.

The sale by the Commonwealth Edison Company of its old Harrison Street generating plant to the Union Station Company marks the passing of what was in its day the most celebrated power station in the country. In 1895, shortly after its construction, the plant had a total capacity of 6,000 kilowatts, making it at the time one of the largest plants in existence. In late years the building has been used as a substation. The plant will be dismantled and the building torn down to make room for the new railroad station to be erected in the vicinity. The sale price was $1,300,000.

MAZDA C LAMPS AND ILLUMINATION PROGRESS.

By H. H. Magdsick,

National Lamp Works of General Electric Company.

When multiple gas-filled incandescent lamps were placed on the market, they at once came into use in large numbers, demonstrating that an extensive field existed for the higher candlepower units that had not been provided for adequately by other forms of illuminants. The manufacture of the Mazda C lamps introduced many new problems. Their early use in large quantities under all conditions served to show in the shortest possible time any weaknesses such as would be expected to develop in a new product. These early faults were overcome through the use of new materials and the redesign of various parts, such as the change to the pear-shape bulb, the use of heat deflecting disk, etc. These refinements produced a superior lamp and, together with further study of gases for use in the bulb, enabled the manufacturers to make advances in efficiency, notably in the smaller sizes. The line of multiple and series lamps has been gradually extended to cover most of the commercial and industrial requirements and the entire range of street-lighting circuits, with the result that several million have already been placed in service. As has always been true in the incandescent lamp industry, increasing production brought a decrease in cost.

The Mazda C lamps quickly brought about a considerably higher standard in the commercial, industrial and street illumination fields and made practicable several new lighting applications. The high efficiency and the availability of the larger units gave a great impetus to high-intensity lighting for outdoor display purposes. Light as an attractive force is now employed on a far greater scale than ever before. This tendency no doubt contributed to the adoption of increased illumination as the new lamps were generally introduced in stores and offices. Partially and totally indirect systems multiplied and on every hand there was evident a growing attempt to meet the more obvious requirements of good lighting. Decorative effects received more consideration as it became less costly to utilize some of the light in obtaining the desired appearance of units and interiors. In industrial plants the chief result of the less expensive light production was likewise the use of higher intensities so as to provide the best possible working conditions, for the value of lighting as a factor in production and the safety of the workmen and its relatively low cost had already become well established in the minds of many factory managers. The Mazda C lamp has hastened the replacement, already far advanced by the vacuum lamp, of the older illuminants which were not only less adaptable to specific locations and less capable of efficient utilization, but also higher in operating cost.

The gas-filled lamps made practicable the employment on a large scale of light modified to meet special requirements in commercial and industrial applications. Light of a sunlight color value is now supplied for entire shops or departments of a store at little increase in the cost of illumination. North-sky daylight is reproduced at an efficiency such that the extended use of the units in service has proved them a practical success for locations in industrial plants and in stores where exact color discrimination is required.

The value of known constant artificial illumination in photography had long been recognized, for by its use the work might be carried on more rapidly and at all hours of the day or night. However, artificial lighting had had only a limited application among photographic studios because the systems available were costly, lacked the necessary flexibility and control of light, or failed to duplicate the results secured under daylight. The gas-filled lamp met the requirements of the photographer and came into extended use. The light was modified by screening out some of the luminous rays but leaving the radiation which is most active on the photographic plate. Thus was reproduced in inexpensive units, permitting full control of the intensity, direction and diffusion of the light. a photographic daylight which gives the correct relative brightness values to the various parts of the scene.

Modified light of the Mazda C lamp was found equally effective in meeting the severe requirements of motion-picture production. Such installations in the studios of leading producers have demonstrated the higher quality of pictures secured with this light which renders relative brightness values correctly, can readily be directed and diffused as each setting demands, and dimmed or altered at will during the scene, and mixes with daylight so perfectly that it can be used to supplement the latter at any time without special precaution. As the motion-picture art progresses, there is a growing appreciation of the large contribution that lighting can make to the effectiveness of the scene. There is more total actinic radiation per watt from the mercury-vapor and arc lamps, which formerly were alone used in this field, than from the usual Mazda C lamps at rated efficiency. However, the camera is in operation for only a few minutes at a time and for but a short total period each day. It has, therefore, been found practicable to make provision for burning the lamps at a higher voltage during the intervals of exposure and thereby greatly increasing the actinic radiation. The use of the largest lamps in this manner combined with the more efficient control of light secured with the incandescent lamps overcomes the deficiency in actinic value which would otherwise be found. The investment required for the incandescent installation, which is but a fraction of that for the older systems, is another consideration which is contributing to the growing use of the gas-filled Mazda lamps for this service. Because of the short period of burning each day, the fixed charges form a large proportion of the total cost of lighting.

Concentrated filament lamps of the gas-filled type are in demand for projection purposes. At first they were applied only to the smaller lanterns but the lamps are gradually being adapted to the larger projection apparatus as well. This type of lamp has also brought "flood lighting" to a state of development where it may be applied profitably to monumental public buildings and business structures in every city. Compact, inexpensive but highly efficient weatherproof projectors have been designed for the lamps. At a low initial investment and with a moderate cost of operation any structure in its entirety may now readily be made to stand forth in a flood of light from concealed sources.

In street lighting the Mazda C lamp has met with conspicuous success. Considered merely on the basis of initial efficiency of light production, it would not have been so generally adopted instead of the highest efficiency arc lamps. But there are other considerations which have led to the conclusion that the most effective illu-

mination would be obtained at the lowest total cost with the Mazda system. Some of the more important of these follow:

Low Initial Investment.—The first cost of the Mazda C lamp and equipment is less than that for other systems, hence, the fixed charges, which are each year becoming a more important part of the cost of supplying street-lighting service, are reduced. In the case of the thousands of alternating-current inclosed carbon arcs still in service, the change to Mazda units could be made at so moderate an expenditure that far greater illumination could be furnished to the city without necessitating an increase in rates.

High Power-Factor.—The power-factor of the Mazda circuits is much higher than with other modern series lighting equipment. With the latter, for each watt delivered to the lamp from 30 to 40 per cent greater capacity is required in generating apparatus, transformers, regulators, etc. The fixed charges on this added equipment form a considerable part of the cost of supplying energy to such circuits.

Adaptability.—Improvements in the efficiency of the modern arc lamps have tended toward higher candlepower units, which did not serve the requirements most advantageously in all locations. The incandescent lamps are available in so many sizes that the proper unit may be installed to meet each condition, the various sizes of lamps burned in series on the same circuit, and changes made in individual lamps from time to time as the requirements alter. The lamps may be operated in an endless variety of fixtures for overhead or post construction, so that any desired decorative effect may now be obtained.

Control of Light.—With the aid of the Holophane prismatic refractor and other accessories, the generated light flux may be utilized to produce the most effective illumination. The intensity near the horizontal is thus also under control and may be reduced to minimize what is perhaps the most important element of glare under street-lighting conditions. This control of light may be retained even in ornamental fixtures. Furthermore, the light is steady and the candlepower of the lamps falls off only slightly from the initial value during their normal life.

Superior Operating Characteristics.—The Mazda system greatly simplifies maintenance. With it, also, safety may be insured by the use of individual two-circuit transformers with grounded secondaries, which insulate the lamp circuit from the high voltage of the series line. By placing the transformer on the pole, where pendant lamps are used, much of the open-circuit trouble is eliminated.

Future Developments.—The experience of past years indicates that increased efficiency and decreased cost of lamps may be anticipated. Thus, during the past year, the efficiency of high-current Mazda C series lamps has increased 10 per cent and the price has been reduced. The cost of operating Mazda street-lighting circuits therefore becomes less year after year. The increase in efficiency releases capacity which allows the addition of further units to the same circuits or permits the use of higher candlepower lamps where they may be demanded.

Service Performance.—Reports of installations in all parts of the country indicate that the life of the Mazda C series lamps has somewhat exceeded the rating of 1,350 hours. In fact, from the first these units have proved most satisfactory for all classes of street lighting.

These considerations explain the wonderful progress of the gas-filled incandescent lamp in street illumination. They suggest why the city of Chicago has been able to provide more effective lighting with Mazda C lamps than with modern arcs at a saving of nearly $20 per year per lamp in cash costs and fixed charges and is able to extend widely the use of a limited inexpensive power supply. These factors also led to the recent adoption of the incandescent lamp for Cleveland's great "White-Way" system after months of study and trial of the most modern lamps of every type.

Press Congress of the World Formed.

The Press Congress of the World, an international organization, to meet triennially at the world's capitals, and to embrace workers in every department of journalism in all countries, was formed at the International Press Congress which met July 5 to 10, 1915, at the Panama-Pacific International Exposition, in San Francisco. A brief constitution was adopted and officers were selected, two vice-presidents from each nation, an executive committee, a secretary-treasurer and a president. The office of the president was made the permanent headquarters of the Congress. The invitation of the Government of New South Wales to hold the first meeting of the Press Congress of the World in Sydney, Australia, in March-April, 1918, as presented by Niel Nielsen, Commissioner from New South Wales, was accepted.

The Congress, opened by an address by William Jennings Bryan, and responded to on behalf of the Congress by John Clyde Oswold, president of the Federation of Trade Press Associations, was large in number, important in personnel and program. The Honorary President was Virgilio Rodriguez Beteta, of Guatemala, editor *Diario de Centro America*. The enrollment was 957 delegates, accompanied by 1,230 visitors, a total of 2,187 persons in attendance. This enrollment represented 29 nations and 46 states of the United States. Of the delegates 697, or three-fourths, were from outside California and 123 from outside continental United States. The trade press of the United States was actively represented by Mr. Oswold as noted above; an address, entitled "The Service of the Trade Press," was presented by Charles W. Price, editor of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, and an address was presented by B. B. Herbert, editor of the *National Printer-Journalist*.

The constitution provides that the organization shall be known as the Press Congress of the World. Its object is to advance by conferences, discussions and united effort the cause of journalism in every honorable way. The sessions of the Congress are to be open to the consideration of all questions directly affecting the press, but discussions of religion, politics and government policies will not be permitted. Workers in every department of journalism in every country who are engaged in promoting the highest standards and the largest welfare of the press are eligible to membership. The officers shall be an honorary president, a president, two vice-presidents, secretary-treasurer, an executive committee, consisting of the president, secretary-treasurer and five additional members chosen from the vice-presidents. These officers, with the exception of the honorary president, to be chosen by the executive committee, shall be elected at each session of the Congress. The vacancies shall be filled by the executive committee upon recommendation of the countries affected. The time and place of meeting shall be determined by the executive committee. The constitution may be amended at any meeting under provisions to be established by the executive committee.

The officers elected are: President, Walter Williams, Dean of the School of Journalism, of the University of Missouri, Columbia, Mo., U. S. A.; secretary and treasurer, A. R. Ford, secretary, Dominion Press Gallery, Toronto, Canada; and the vice-presidents.

A new street-lighting system was recently completed and put in service in Niagara Falls, Ont. There are 101 gas-filled tungsten lamps rated at 500 watts, 1,000 candlepower. The lamps receive 20 amperes through individual compensators.

THE LUMINOUS ARC LAMP.

By R. B. Hussey and S. C. Rogers.

Street Lighting Section, General Electric Company.

The earliest form of electric light was the open-burning carbon arc which was first made experimentally more than one hundred years ago, and up to the present time this is still the only commercially available light source where a very high intensity is required, as in the case of high-power searchlights.

The open-burning carbon arc was superseded in common street-lighting practice in this country a number of years ago by the relatively less efficient, but more reliable enclosed carbon arc lamp. This in turn was replaced by the flame carbon and the magnetite or luminous arc lamps. Since all four of these have been so extensively used throughout the United States for street lighting, it may be of interest to note some of their points of similarity and difference.

The source of light of the open carbon arc was a small area on the bottom of the upper carbon, known as the crater. This in itself would give a distribution of light as shown at the left of Fig. 1, but since the lower carbon obstructs a considerable amount of the light beneath, and since a little is added from both the lower carbon tip and the arc stream, the resulant distribution is as shown on the right of Fig. 1. The direct-current enclosed carbon arc burns in a similar manner, but as the ends of the carbon are nearly flat and the arc is of greater length, the light distribution is somewhat altered, resulting in a distribution curve as shown in Fig. 2. In the case of the flame carbon and luminous arcs, the light is emitted almost exclusively by the arc stream, which is in the form of a luminous column, giving a distribution of light as shown in Fig. 3 and Fig. 4. In all of these there is a burning up or vaporization of one or both of the electrodes which must be replaced at greater or less intervals according to conditions. The arc that has stood best in present-day service and bids fair to continue for a considerable time as a superior street-lighting unit, is the so-called luminous arc or magnetite arc.

The term "magnetite arc" was early applied to this lamp because of the fact that at that time a considerable proportion of natural oxide of iron or magnetite was used in the composition of the negative electrode.

It was found desirable to use iron oxide in some form as a medium, as this material was not only cheap and easily obtained, but provided a solid conducting tip even after having been melted. A small amount of chromium oxide was also found desirable as a restrainer and steadier, and while these materials would give a good arc as far as operation and steadiness are concerned, the efficiency could not be raised to any practical value. It was practically necessary to use titanium in some form in order to arrive at any commercial light efficiency. In addition to these constituents, a very small quantity of flux is generally used for the purpose of steadying the burning of the arc.

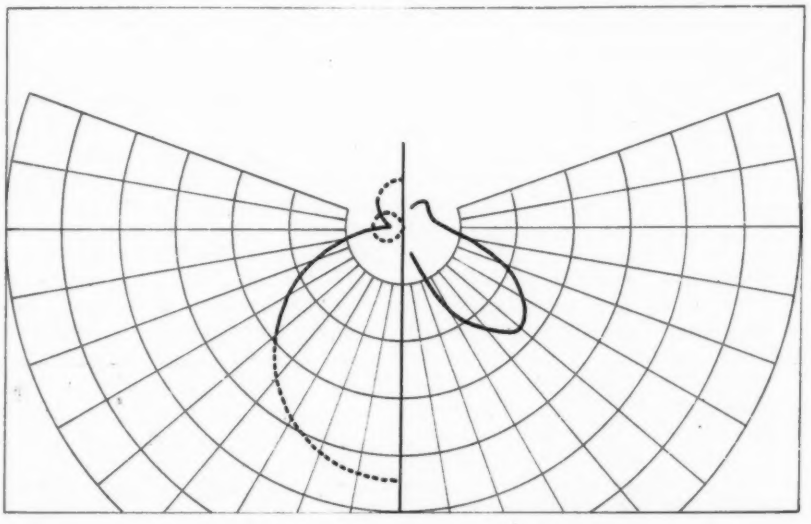


Fig. 1.—Distribution of Light with Open Carbon Arc.

An arc drawn between such an electrode as negative and a solid metallic positive appears as a brilliant fan-shape, starting from a very small, highly luminous point at the surface of the cathode and spreading out as it approaches the anode (Fig. 5). The arc appears to be composed of a central zone or core which is highly luminous and of a pale bluish color. This core presumably acts as the principal conductor of the current. Immediately surrounding this is a thin white envelope of the highest luminosity, which is in turn surrounded by a large, diffuse envelope of a lower degree of luminosity and of a yellowish color. The net result in color is a most excellent white, approaching very closely to the color of clear sunlight. The efficiency of this arc is high, showing conservative values of 13 lumens per watt at 4.0 amperes; 18 lumens per watt at 5.0 amperes, and 24 lumens per watt at 6.6 amperes. In normal operation, both ends of the arc move slowly over the surfaces of the respective electrodes, but the light, although subject to variations in intensity, does not show the surges or distinct maximum and minimum points as in the case of the enclosed carbon arc lamp. While it is doubtless possible that electrodes could be produced that would give satisfactory operation over a very wide range of current and potential, the most satisfactory operation has so far been obtained at current strengths between four and seven amperes and with potentials across the arc of 60 to 90 volts.

In the adaptation of an arc of this type into a commercial lamp, many new problems were encountered.* One of the first of these was the question as to whether the positive or negative electrode should be uppermost. It was found upon experiment that in order to make the arc luminous throughout its entire length, it was necessary to provide a circulation of air in the direction of the arc blast, i. e., from cathode to anode, as other-

*See G. E. Review, Vol. XIV, 1911, Page 578.—"The Design of Luminous Arcs," by C. A. B. Halvorson, Jr.

wise the arc would be brightly luminous for not more than half its length, the remainder being of a pale blue color.

A forced or artificial draft downward was tried, but proved unreliable and the arrangement was then adopted of placing the positive or relatively non-consuming electrode above and the negative below. In this way, the natural upward circulation of heated air was utilized with no tendency to make any portion of the arc non-luminous.

Another difficulty encountered was that of the fumes given off by such an arc. In the early carbon arc lamps, both open and enclosed, the products of combustion were entirely gaseous, but, with an arc of this type, a considerable quantity of metallic oxides are given off which must be carried away from the arc chamber. This is done by providing a central chimney, at the lower end of which the arc burns, while the upper end is left open for the fumes to escape.

Another limitation which was early found to be quite important was that the materials used as electrodes had a distinct rectifying effect, so that such an arc could not be practically operated on alternating current. Furthermore, in order to maintain a satisfactory arc, a considerable steadying factor must be introduced with the result that the luminous arc is now operated most efficiently on direct-current series circuits and its greatest field appears to be in this direction. Because of this feature lamps were at first used on Brush arc generator circuits and later on rectified circuits, using series mercury-arc rectifiers.

Many different materials have been tried for the upper or positive electrode, the desired properties being that the electrode should remain conducting at all times and should burn away very slowly and not be expensive. Owing to its high heat conductivity, copper has been largely used for this purpose, although at high temperatures the copper oxidizes rapidly and must be sheathed with iron, which, although it burns away more rapidly directly in the arc, is not oxidized badly at temperatures slightly lower. The positive electrode adds relatively a very small amount to the light of the arc.

The earliest lower or negative electrodes contained magnetite with the addition of rutile or titanium oxide. This was soon replaced by ilmenite which is an ore composed of the oxides of iron and titanium. As this ore contains a little more titanium than was desired, a small quantity of magnetite was added to maintain the desired relative proportions of iron and titanium. For the chromic oxide content, a suitable ore was found in chromite, which is a mixed oxide of chromium and iron. These different ores, magnetite, ilmenite and chromite, are first separately ground and carefully purified, using a water table and magnetic separator. Each lot of ore prepared is carefully analyzed and from the results of the analysis the exact proportions of each constituent that will be required are determined. Next, a large ball mill is loaded with the proper quantities of the purified ores, together with a relatively small amount of flux, and the whole ground to a certain degree of fineness, also determined by experiment. It has been found that the best results are obtained when the particles of mixture are neither too fine nor too coarse. When sufficiently ground the mixture is loaded into iron tubes of the required size and sealed with small iron caps and packed for shipment.

The figures given above for efficiencies of the magnetite arc are for the older or long-life electrode, but within the last two years a new electrode has been marketed that gives a considerably greater amount of light. With this electrode, efficiencies of 20 lumens per watt may be obtained at 4.0 amperes; 28 lumens per watt at 5.0 amperes, and 32 lumens per watt at 6.6 amperes.

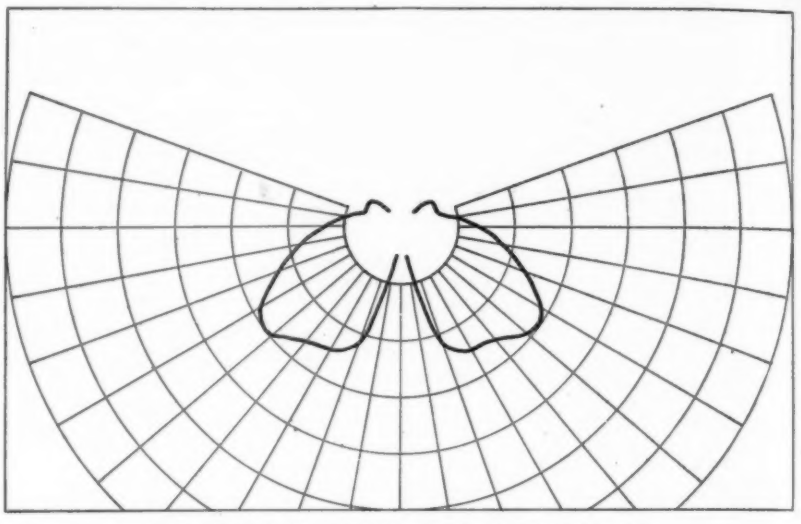


Fig. 2.—Distribution of Light with Enclosed Carbon Arc.

Wherever an asymmetric distribution of light is desirable, as, for instance, to increase the intensity of light up and down a street, flat electrodes can be furnished that will increase the light in the required directions. This result is obtained because there is less light obstructed by the electrode in that direction. This type of electrode also makes possible the operation of arcs of lower voltages, thus 4.0-ampere arcs may be operated at 68 volts (272 watts) where a few more lamps per circuit are wanted or the increase in lamp ca-

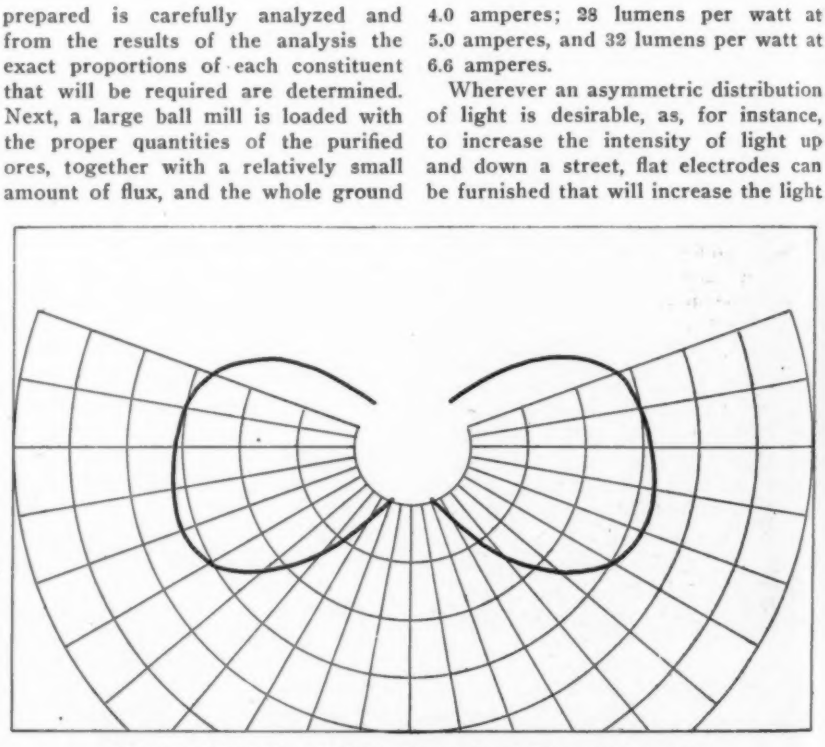


Fig. 3.—Distribution of Light with Enclosed Flame Carbon Arc.

pacity may be utilized at more central points where a high intensity of illumination is required, this result being accomplished by lamps adjusted to as high as 90 volts. This may be done on existing lamps with little or no expense and since the burning life of the electrode is dependent almost

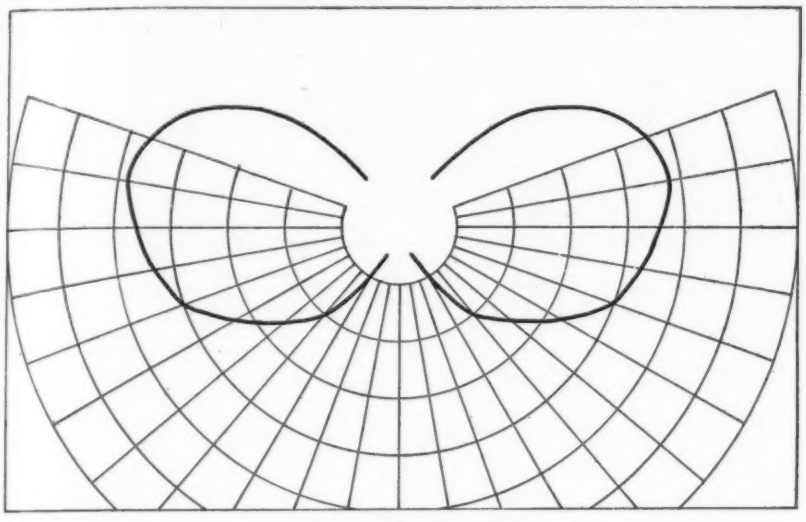


Fig. 4.—Magnetite Arc.

wholly on the current, the trimming schedule will not be affected. This, it is readily seen, provides a system of reasonable flexibility.

At the present time there are two distinct types of luminous arc lamps, pendent and upright for mounting on ornamental standards and brackets.

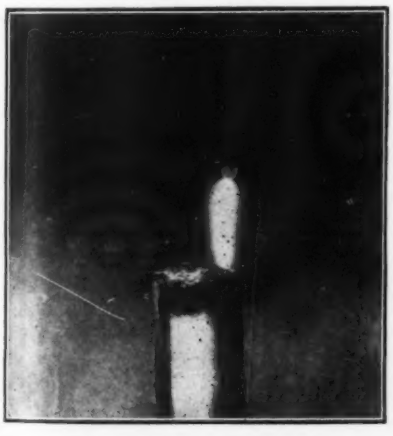


Fig. 5.—Normal Four-Ampere, Luminous Arc with Bead on Positive.

Commercial pendent luminous arc lamps are manufactured to operate on 4.0, 5.0 and 6.6-ampere direct-current series circuits and are known as Form 3, Form 6 and Form 17 lamps. There are more than 200,000 Form 3 and Form 6 lamps in operation today. There has been exploited commercially within the past year, the Form 17 lamp, which combines the advantages of both the Form 3 and the Form 6 lamps and other improvements as well (Fig. 6).

The Form 3 lamp was designed for either 4.0 or 5.0 amperes and the Form 6 for 5.0 or 6.6 amperes, whereas the Form 17, with different windings, is used for all currents. This in itself is a great improvement, enabling as it does central stations serving different circuits with different currents to standardize the design of lamp and carry the same parts for all lamps with the exception of the windings.

The mechanism of the Form 17 luminous arc lamp is very simple and needs little explanation. It is without floating parts and when the lamp is out of circuit its electrodes are separated by a fixed distance. When the current is thrown on the starting magnet brings the lower electrode into contact with the upper electrode, thus allowing the current to flow through the series magnet, thereby opening the circuit of the starting magnet at the cutout contact, allowing the lower electrode to fall, striking an arc. The lamp is then burning with the lower electrode resting on its stop and the series magnet holding the cutout contact open. As the lower electrode is slowly consumed, the voltage across the arc rises and when this arc voltage has reached a predetermined limit, the shunt coil (which is bridged across the arc) cuts the starting coil into circuit again, feeding the lower electrode and bringing it into contact with the upper and starting the arc as before.

The series magnet is of low resistance and causes a drop of only a volt or two (depending upon the current) between the terminals of the lamp and arc when the lamp is in operation. The lamp is so designed that only two single adjustments are necessary, the adjustment of the shunt armature to feed the lamp at the proper arc voltage and the setting of the stop for the lower clutch to determine the proper length of arc.

The upper or positive electrode usually consists of a bar of hard-drawn copper enclosed in a steel or brass sheath, and when it is consumed it may be readily removed from the holder and replaced by another. The mechanism for holding this electrode is very simple and produces a wiping contact whenever the lamp feeds and thus insures starting under all conditions.

Luminous arc lamps are trimmed at intervals from 110 to 350 hours, depending upon the current and electrode used. This makes the trimming incidental to cleaning, for best practice now shows that all street lamps should be cleaned at least once a month. This infrequent trimming, together with the low cost of electrodes, means a *very* low maintenance cost per year. Taking into consideration the high efficiency of the luminous arc lamp, an intensity of illumination per dollar is obtained which is not equaled by other illuminants.

The distinctive pearl-white color is unexcelled and unapproached by other illuminants on the commercial market at the present time.

One of the latest developments in auxiliaries for these lamps for street lighting has been the adaptation of a

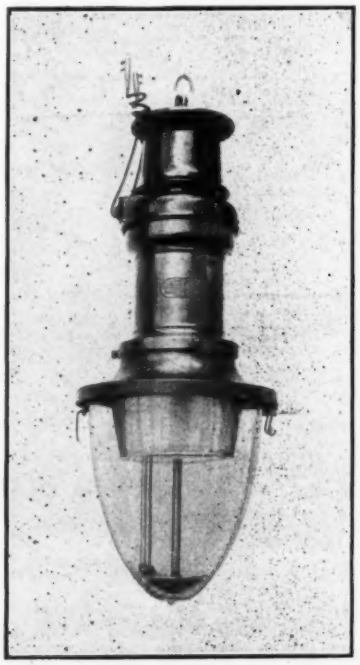


Fig. 6.—Form 17, Luminous Arc, with Prismatic Refractor.

prismatic refractor in place of a metal reflector. The prismatic refractor consists of two truncated conical glass globes, open at the top and bottom, fitting inside one another and forming a single unit which is smooth on both

inside and outside surfaces. The inner section is girdled by a succession of horizontal prisms which intercept all the available light rays given off from the arc above the horizontal and deflect them downward at an angle of 10 degrees below the horizontal (as shown in the vertical section in Fig. 7), which is generally accepted as the most useful angle for the lighting of highways and large areas. The inner surface of the outer section is lined with a series of vertical prisms which serve to diffuse the light (as shown in the horizontal section of Fig. 7). By the use of this prismatic refractor, the maximum candlepower values at 10 degrees below the horizontal are increased approximately 50 per cent (Fig. 8). Approximately the same effect can be produced by a single reflector of 46 feet in diameter or by a biplane reflector of 51 inches in diameter or a triplane reflector of 26 inches in diameter (Fig. 9). These latter equipments, while very efficient in light redirection, are more unwieldy than the prismatic refractor which is only 11 inches in diameter and so have not been standardized.

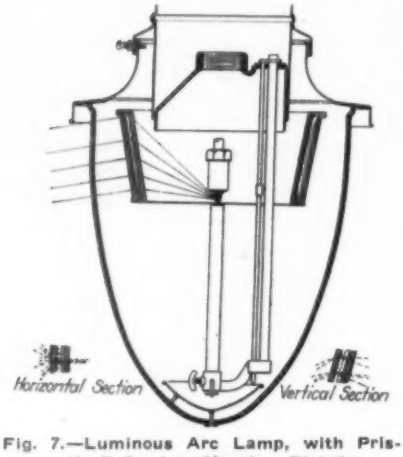


Fig. 7.—Luminous Arc Lamp, with Prismatic Refractor, Showing Distribution of Light.

The prismatic refractor equipment is usually recommended when the road surface provides a high specular reflection and when the lamps are to be spaced at 300 feet or more apart. Lamps thus equipped will be more effective when suspended at a height of 25 feet or more above the road surface. (See Fig. 10, where this type of lamp is shown spaced 600 feet apart.) When the surface of the road is dark and of a diffusing character, the same lamp without a prismatic refractor, but with a diffusing globe and reflector is to be recommended, this equipment raising the intensity of light underneath the lamp and aiding vision which in this case is largely dependent upon the silhouette principle.

The ornamental luminous arc lamps are made for the same currents as those previously described; viz., 4.0 5.0 and 6.6 amperes, direct-current, series circuits. In these lamps, which by the way are not inverted, the mechanism has been placed beneath the arc instead of above it. The mechanism of these lamps is mounted on an ornamental pole and separated from it by a high-voltage insulator and is properly protected from the weather by an ornamental casing (Fig. 11). An absolute cutout is placed in the base of the ornamental pole so that the lamp may be disconnected from the line when trimming is necessary, the latter being accomplished through the opening at the top of the globe.

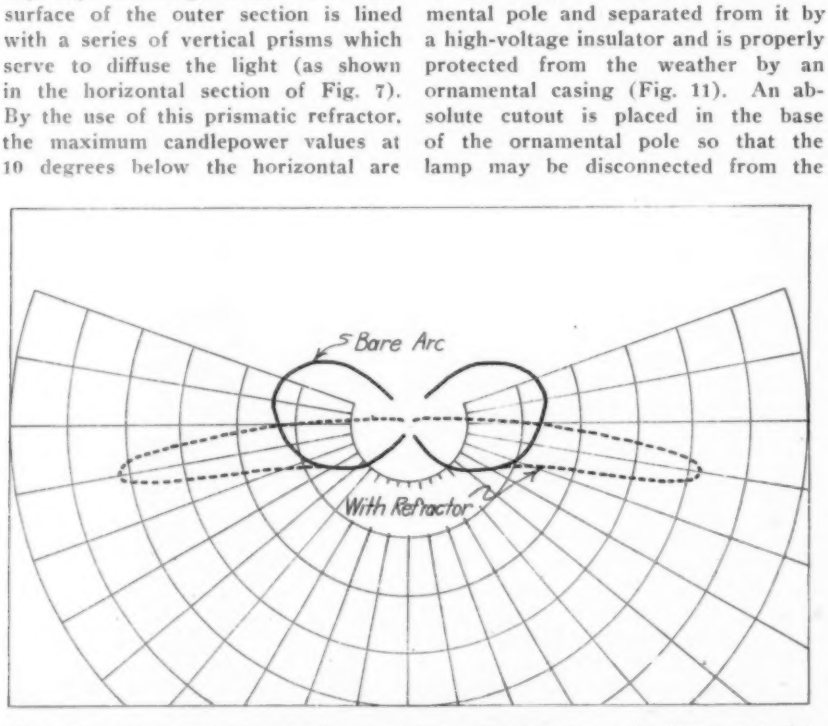


Fig. 8.—Luminous Arc Lamp, Equipped with Prismatic Refractor—Distribution of Light.

Nearly all mechanical and electrical parts are interchangeable with those of the pendent type. This in itself is a great advantage. It is, of course, obvious that both types of lamps may be operated on the same circuits. The diffusing glassware of the ornamental luminous arc lamp is dignified and aristic, there being at the present time two distinct shapes, the well known standard with slightly concave sides and the nearly spherical or Washington type.

The Washington type globe consists of two hemispherical metal-ribbed frames, holding segments of diffusing glass, there being 12 sections in all. The glass segments are inserted from the inside of the frame and can readily be replaced while in position on the pole. Different densities of glass may be used, so that various effects may be produced as desired, as for instance, a light glass on the side toward the street and a denser glass toward the sidewalk and residences. When the lamp is in operation the glass becomes a luminous surface, radiating a powerful yet soft light without glare.

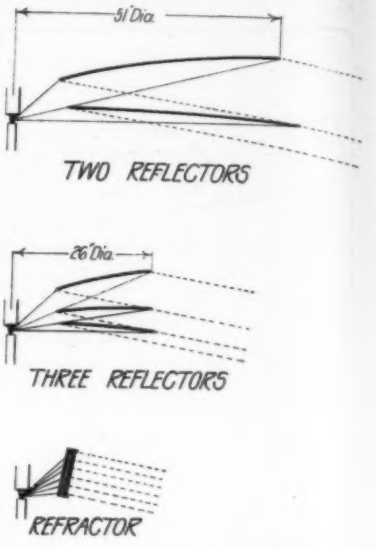


Fig. 9.—Comparison of Distribution with Different Reflectors.

Very pleasing and striking results may be obtained by raising the voltage of lamps at intersectiong streets and by equipping with the Washington type globes. This, by its increased amount of illumination and individuality of appearance, calls attention to these locations. Such an arrangement may also be used to mark places of distinction, such as squares, parks, etc. This also enables the main streets to be of one intensity, by using a higher voltage, and the side streets of another intensity, with a lower voltage, and this range of intensity may be accomplished on the *same* circuit by using different electrodes or varying the arc voltage or by the combination of both.

When either the long-life or high-efficiency electrodes are used, an increase in arc voltage will give a

Fig. 10.—Night Illumination, Nahant Road, Nahant, Mass., with Form 17, Luminous Arc Lamps Equipped with Prismatic Refractor—Height, 25 Feet; Spacing, 600 Feet.

slightly greater than proportionate increase in candlepower. Keeping the current and voltage the same and changing from a long-life electrode to a high-efficiency electrode will yield an increase of 35 per cent to 60 per cent in the light, depending upon the particular current. If, however, the change from long-life electrode to high-efficiency electrode be made, and the arc voltage be increased at the same time, an increase in illumination of from 75 per cent to 100 per cent may be obtained.

For boulevard and park lighting the ornamental luminous arc lamp gives excellent results mounted on 18-foot ornamental poles with a spacing of from 250 to 500 feet, depending on the character of the road surface. The intensity of illumination is ample for both pedestrians and automobilists.

In many cases the use of these lamps makes the natural scenic attractions visible by night, at the same time providing a dignified though inconspicuous unit that harmonizes well with the surroundings.[1]

For residential street lighting, however, particularly those streets lined with low branching shade trees, a lower mounting height is preferable, a 14.5-foot pole, with a Washington type equipment, making a most acceptable arrangement. A residential street thus lighted produces a soft, pleasing effect without glare or discomfort to residents or passers-by.

In good practice, in intensive or "White Way" lighting, high-candlepower lamps of this type are used, and in order to attain the desired result must be spaced closely, averaging about 100 feet apart on each side of the street. In this type of lighting, the illumination of building fronts is quite as important as the illumination of the street surface, and therefore the distribution and color of light from the ornamental luminous arc lamp is ideal, the cornices, facades and other architectural details being brought out as well by night as by day.

On account of these features, this unit was selected for the main street and decorative lighting of the San Francisco Exposition.[2]

Sufficient intensity of illumination on the street surface due to the high efficiency of the luminous arc has made possible the commercial utilization of the upward light. The upward light in the angles just above the horizontal is of great importance in illuminating buildings on the farther side of the street. It can be readily seen that if the upward light be wholly suppressed, dark shadows will be produced on the building fronts, giving an unfinished

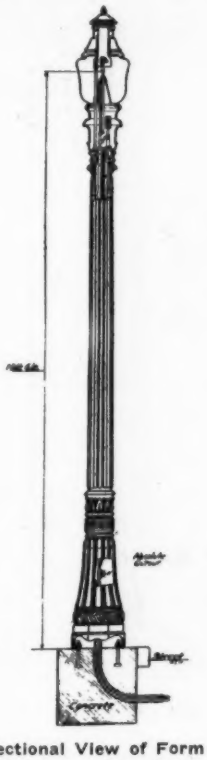


Fig. 11.—Sectional View of Form 10, Ornamental Arc Lamp, Mounted on Lynn Design Post.

effect to the street and causing a dismal and depressing effect on the eye, particularly when the light sources themselves are screened from view. Intensive lighting with the ornamental luminous arc lamps is produced with a minimum amount of glare and the effect of the lighted units upon the eye at night is more pleasing and can only be obtained by good diffusion with low intrinsic brilliancy (Fig. 12

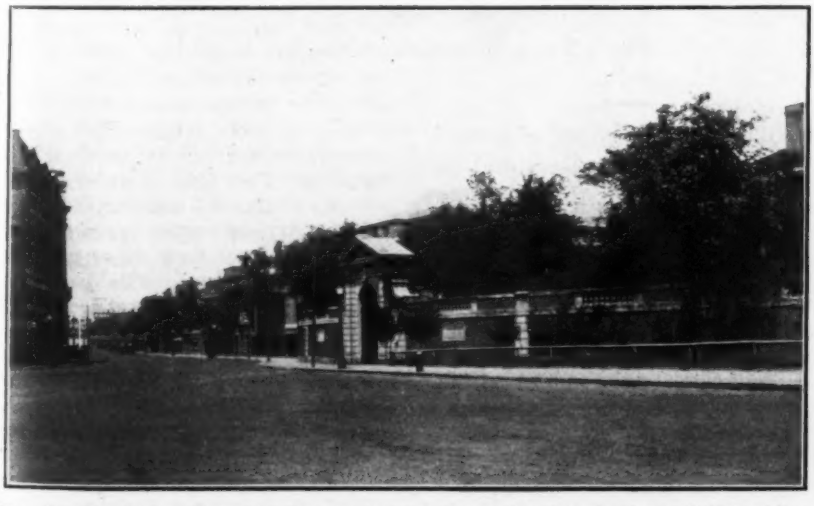


Fig. 12.—Day View, Form 10, Ornamental Luminous Arc Lamp, Harvard University, Massachusetts Avenue, Cambridge, Mass.

1 See G. E. Review, Vol. XVII, 1914, Page 212.—"An Example of a Wooden Arc Lighting System Applied to the Lighting of Boulevards," by G. N. Chamberlin.

2 See G. E. Review, Vol. XVIII, 1915, Page 579.—"Illumination of the Panama-Pacific International Exposition," by W. D. A. Ryan.

and Fig. 13). The lamps especially recommended for this type of work are the 5.0-ampere and 6.6-ampere with either long-life or high-efficiency electrodes.

It is now a well known fact that for a merchant to obtain trade, he must have good show-window lighting, but the best display lighting is of little avail if he is unable to get people on the street. Therefore, it is evident that the streets must be well lighted to bring the people into the street at night. This is accomplished by the intensive or so-called "White Way" lighting, which although originated but a few years ago, has already proved its worth and is rapidly being extended in all parts of the country.

At first the contention was made that a bright light outside a store window detracted from the lighting therein and in consequence the display of goods lost much of its effectiveness. This is still so where contrast is lacking between the illumination on the street and that in the show window. In that case, the goods look unattractive and have little life or distinctive feature, but when the ornamental luminous arc lamp, with its *pearl white* light, is used in contrast to the soft color of window display lighting, there is a marked difference in the appearance of the goods displayed and these results can only be accomplished by the use of the ornamental luminous arc lamp.

In conclusion, the pendent and ornamental luminous arc lamps are light sources of most excellent color and high efficiency and have been developed through systematic and consistent research and brought to a position second to none as street-lighting units, suitable for all clases of street lighting and are particularly recommended for boulevard and intensive or "White-Way" illumination.

Fig. 13.—Night Illumination, Central Street, Lowell, Mass.—Form 10, 6.6-Ampere, Direct-Current, Ornamental, Luminous Arc Lamps.

Calculation of Strength of Electric Currents When Measured by Rayleigh Current Balance.

Probably the most accurate method for the determination of the value of the strength of an electric current in absolute measure is by means of the Rayleigh current balance, in which the current to be measured is passed in series through two parallel circular coils of unequal radii, one of which is suspended from the beam of a balance. The distance between the planes of the coils is varied until the force of attraction between the two coils is a maximum, and the value of the force is obtained by adding weights to the other arm of the balance until its equilibrium is restored. Since the maximum force obtainable depends on the ratio of the radii of the coils alone, and not on their individual dimensions, it is only necessary to determine further the ratio of the radii of the coils, and this may be done with great accuracy by electrical means.

The constant of the instrument, that is, the maximum force per unit current for the coils in question, has been obtained in the past by interpolation between values of the force, calculated for various assumed distances of the coils, in the neighborhood of the critical value for which the force is a maximum. For, although the general formulas of Maxwell and Nagaoka give the value of the force for any two given coils at any assumed distance with great accuracy, no formula has been heretofore published for calculating at what distance the force becomes a maximum. To supply this lack there is derived in a paper just published by the Bureau of Standards entitled "The Calculation of the Maximum Force Between Two Parallel, Coaxial, Circular Currents," a formula which gives the critical distance as a function of the ratio of the radii.

General Electric Company Veterans Celebrate.

The General Electric Quarter Century Club of the Schenectady works held its first outing Saturday, August 28. The excursion was made to Lake George over the Delaware & Hudson Railroad, by special train and steamer. Many of the men who have made history in the electrical industry were present. The following interesting account of the celebration is published as reported in the Schenectady (N. Y.) *Gazette* of August 30:

"The party had a 70-mile trip to the Hague on the steamer, dinner being served on board. Accompanied by the General Electric band of 40 pieces, under the leadership of C. F. Roth, the party of 248 persons enjoyed the outing under weather conditions which left nothing to be desired. Of those in the party, 206 were members of the Quarter Century Club, ranging in age from Joseph Tullus, who is 74 years old, to Alderman William Dunn, who recently acknowledged a record of 38 years. G. E. Emmons led the party in length of service, his relations with the General Electric Company dating from 1881.

"As its name implies, the Quarter Century Club is composed of men and women who have been in the service of the company 25 years or more. The electrical industry had its first substantial beginning in the decade of the eighties, though its chief development followed after 1890. Those who were venturesome in the industrial world at that time became pioneers in a new field of work and the pioneers of that earlier time are the Quarter Century Club men of today. The representative character of the club membership is indicated by the fact that 70 office and factory departments were represented on Saturday's excursion, from the executive department of the company to the specialized departments of the Schenectady works organization. A more democratic gathering than the excursion party would be hard to find. Men of all departments met on an equal basis of service. Friends of long standing from the office and factory departments shared the common pleasures of the day. Three women members of the club were accorded the warmest welcome. Three members from the Pittsfield works and one from the New York office were present with the party.

Average Age Only 52.

"Special significance attaches to the fact that the average age of the 206 club members who attended the excursion was 52 years. The 'old fellows' were in a minority as to numbers, if not in years. A fine esprit de corps was apparent throughout the day which reflected the working strength of the General Electric organization. The best of good fellowship prevailed from the 'all aboard' of the conductor, the start in this city, to the 'Auld Lang Syne' of the band as the party was separating at the union station for the return home.

"The presence of President E. W. Rice, Jr., and C. A. Coffin, chairman of the board of directors, was missed by the members of the excursion party. Both are members of the Quarter Century Club and both regretted being unable to share in the outing.

"Additional interest attaches to the fact that while the Schenectady works' organization has 250 men of the club, as many more are to be found in the district offices and the other works of the company at Lynn, Pittsfield, Harrison and Fort Wayne. All told the club has over 500 members, who have been a vital part of permanent organization of the General Electric Company during the past 25 years. In recognition of this loyalty, the company made the excursion a complimentary occasion, this circumstance being greatly appreciated by all who were present.

Those Present.

"The following men attended the excursion, representing the departments named:

"Martin Anderon, G. W. Anthany, F. J. Arthur, W. S. Ashdown, H. L. Baltozer, G. Bathrick, L. G. Banker, J. B. Barr (New York office), A. F. Batchelder, C. Baumgartner, J. Beck, W. G. Benning, George Bernhard, Charles Benth, E. S. Beyer, James Birkel, J. T. Bliss, A. Bolander (Pittsfield), James Bostock, C. Brede, A. L. Bretton, J. H. Briggs, J. J. Briggs, A. Brinkman, J. T. Broderick, Fred Brown, John Bunk, J. W. Burdick, W. C. Buschmann, C. F. Butterfield, D. C. Campbell, W. G. Carey, M. Carroll, F. Coates, A. Collins, O. R. Clark, J. H. Clune, J. Cokeley, C. Collins, William Consaul, J. M. Coon, W. J. Coughlin, George Cowlam, Stephen Danaher, J. Y. Daniels, D. C. Davis, W. M. Deming, A. J. Dettbarn, J. A. Donne, W. F. Dress, William Dunn, Job Duck, A. Dugglin, G. E. Emmons, Dana Fabray, L. D. Fairchild, C. H. Fetter, Luke Flannigan, L. Ford, A. Fowler, C. Fransen, Garrett Frederick, J. F. Freese, J. H. Fryer, F. H. Gale, F. N. Geddis, H. Geisenhoner, W. Gommerman, W. A. Goodrich, H. W. Gould, E. Hagan, J. J. Hahn, H. Hart, O. Held, John Hennessey, J. D. Heron, G. M. Hewlett, A. Hilton, Henry Hochuli, Jacob Hochuli, Joseph Insull (Pittsfield), George Iverson (Pittsfield), G. A. Iverson,, Leonard Ives, N. C. Jeffes, P. W. Jensen, Daniel Jewett, Nicholas John, W. F. John, H. L. Kann, T. P. Keating, P. J. Kelley, J. W. Kellogg, Edwin Keenholtz, G. W. Ketchum, G. Kindberg, Anna Klemm, Peter Kirsch, Eugene Klotz, Robert Knapp, J. T. Krug, F. Krug, Patrick Lane, G. Lange, E. La Rochelle, W. A. Lee, F. Loucks, C. E. Luckhurst, A. A. Lundgren, W. H. Lynch, J. McCrudden, T. McCullough, George McDonald, John MacHaffie, J. McKeown, V. McKinney, T. A. McLoughlin, J. H. McMahon, H. Macholz, William Madigan, J. F. Madgett, C. W. Marcley, J. F. Martin, W. J. Marx, H. J. Metz, Sr., John Miller, Joseph Miller, J. I. Mitchell, J. I. Monz, W. T. Moody, Henry Mueller, B. L. Myers, J. D. Myers, A. Neuber, F. J. Newton, George Oetting, C. A. O'Neil, F. W. Peper, C. F. Peterson, Charles Peterson, E. J. Platto, Daniel Posson, M. E. Pratt, E. D. Priest, G. Pross, A. A. Putnam, Christian Rach, A. Richter, John Riddell, Fred Righton, John Riley, J. M. Robertson, Mr. Robinson, A. Rockmer, A. L. Rohrer, A. G. Rolfe, W. G. Rothwell, C. A. Rowe, P. Sauter, W. Saxby, H. L. Schermerhorn, Wm. Schleyer, B. Schulen, F. W. Schulte, Henry Schwab, C. Schwenker, C. Schrafford, J. C. Shannon, R. Sherman, A. Shook, A. Southard, M. Sower, James Spence, Samuel Stein, John Stewart, S. B. Stewart, C. B. Stevens, E. B. Stevens, Leonard Steberg, W. H. Swanker, T. E. Tandy, H. E. Tannis, William Tannis, John Taylor, A. E. Tenney, Julius Tounier, Joseph Tullins, Arthur Turrian, Fred Van Patten, H. A. Van Patten, L. Vogel, D. O. Vrooman, John Waldron, E. G. Waters, F. H. Watson, Dora E. Weaver, J. I. Weller, F. W. Whitmyre, J. B. Wicks, J. H. Wilkie, R. P. Wilkie, A. M. Williams, Linnie Williams, G. H. Winckler, D. O. Youlen, Jacob Zeigler.

"Departments represented: Accounting, general office, accounting, works, advertising, armature, assembling, blacksmith, brass foundry, brushholder, carpenter, coil winding, commutator, compensator, contactor control, container, controller, cost, credit, general office, drafting, engineering, executive, experimental, induction motor, inspection, iron foundry, locomotive, machine, mailing, marble, marine sales, mechanical mica, millwright, motor, moulding, payroll, polishing, porcelain, power station, purchasing, punch press, railway, receiving, record, repair, rheostat, rigging, sales screw machine, searchlight, shafting, shipping, socket, standardizing laboratory, steam fitting, stock, supply, switch, switchboard engineering, switchboard punching, switchboard detail, testing, tool, transportation, treasury, general office, turbine, winding and supplies, wire and cable.

"The officers of the club are:

"President, A. L. Rohrer; vice-president, John Riddell; secretary, Frank Arthur; treasurer, H. W. Leland; trustees. E. S. Beyer, John Waldron, D. O. Youlen."

Butte Church Uses Electric Sign.

An electric sign is to be displayed over the entrance to the Grace M. E. Church in South Butte, Mont. It measures six by two feet and in large lighted letters will be the following inscription: "Grace M. E. Church."

In view of the plans being made by many electrical manufacturers to send traveling representatives and special agents to South America, an article on the high cost of living in Buenos Aires, Argentina, in *Commerce Reports* for July 6, is interesting. No man with a family can live in Buenos Aires in the style to which he should be entitled by his business activities on less than $5,000 per year. It cannot be said that every commercial man in Buenos Aires draws that salary, but by whatever less than this sum he is compensated, by so much must he restrict his expenses and lose in the social and business scale. The conclusion reached by those who know Buenos Aires well, and who are able thereby to make intelligent comparison with the cost of living in the large cities of the United States, is that a salary of $5,000 there, while it may seem ample, is moderate.

THE PRESENT STATUS OF ARC-LAMP CARBONS.

By V. A. Clarke.

National Carbon Company, Cleveland, O.

Arc carbons are nearly unique in the electrical industry in that they depend absolutely upon another electrical product to make them valuable. The development, indeed, of lighting carbons has gone hand in hand with that of arc lamps and a resume of this kind must necessarily deal with the results obtained, as evidence of development, rather than with the details of manufacture of either carbons or lamp, which would interest no one except the manufacturers of these particular lines.

Fig. 1 traces graphically the history of carbon-burning arc lamps for series street lighting from its earliest beginnings until the present. First of all, was the direct-current, pure-carbon, open arc, improved in lamp mechanism and electrode until it reached the efficiency shown. This type of lamp has been practically abandoned in this country, because of its high cost of operation, due to short electrode life, although its illuminating value was good. Both this and the magazine type, inclined-feed flame lamp are still extensively used abroad, because of their high light-giving efficiency as compared with enclosed arcs. In many localities the cost of power is higher than that in the United States and the labor item for efficient maintenance is comparatively much lower, making it economical to still operate these lamps.

The open arc was replaced in this country by the enclosed carbon arc, both alternating-current and direct-current. Although somewhat inferior to the replaced open arc from the standpoint of illuminating values, the case of operation from the station point of view—long life and low carbon cost—outweighed the feature of better illumination. Nearly all the street lamps in the country were at one time of this type and millions of carbons were consumed by them every year. It is interesting to note that in spite of the inroads of magnetite, flame arc and tungsten lighting, nearly 80 per cent as many enclosed arc carbons were sold last year as in the day of their supremacy. Fifteen years ago open arcs were doomed, yet in spite of all the advertising given the later types of lamps and the magazine articles dealing with them, open-arc carbons are still used today in considerable quantities. This simply proves that any complete departure from any one type is exceedingly gradual because each lamp has certain recognized advantages not always to be found in any other.

Inclined-Feed Flame Lamp.

The next development in arc lighting was the short-burning inclined-feed flamer, burned as an open arc. In this type of arc lamp the highest commercial efficiency has been attained. In England, where the magazine type of lamp has reached its highest development, efficiencies as low as 0.18 watt per mean lower hemispherical candlepower are reached in commercial practice. The magazine lamp unfortunately has never found favor on this side of the water. A new departure in street arc lamps can shortly be expected in a type of lamp retaining all the unequaled light-giving qualities of the inclined-feed, open-arc lamp but adapted to American practice. Such a lamp already has been developed beyond the laboratory stage. If it fulfills expectations it will create a strong sentiment in its favor.

Long-Burning Flame Lamp.

The long-burning flame arc lamp, as perfected by the large lamp manufacturing companies, marks the highest development of the arc lamp for street lighting purposes up to the present time. As fast as brought out, these lamps were given to the domestic carbon companies for the development of suitable carbons to burn in them. This has been successfully accomplished, so that we may have no hesitation in feeling that our lamps and carbons are surpassed by no foreign articles of the same type. In some quarters there has been a demand for carbons of foreign manufacture, due perhaps to an instinctive feeling that foreign goods are always better than those made in America. This feeling is being dispelled by the American manufacturers, who have demonstrated again and again to unbiased customers that their carbons are as reliable, as good in color value, as high in candlepower, as efficient and less expensive than the imported ones.

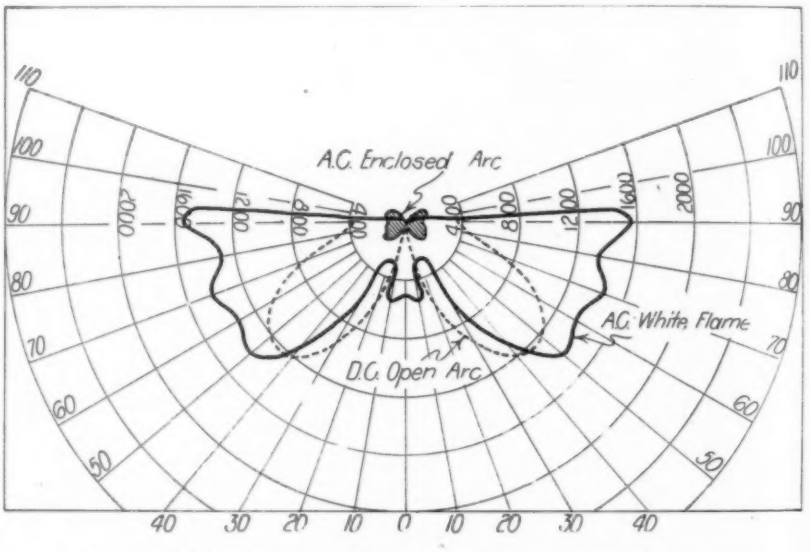


Fig. 1.—Distribution Curve of Alternating-Current White-Flame Arc.

As a street illuminant the chief advantage of the white flame arc is, of course, its high efficiency. For this reason, its use will be dictated in new installations where the cost of power is the deciding factor. Its next great advantage is in its distribution, its natural maximum candlepower being in a plan 20 degrees to 30 degrees below the horizontal, the plane of maximum usefulness for street lighting. In this it is approached by no other lamp but the magnetite. Other advantages are its attractive color, its low intrinsic candlepower with no glare and its availability in large units, which recommend it for large area and "white way" lighting.

The best from any light source can only be attained by intelligent maintenance. If the flame arc lamp is treated as a piece of producing machinery in-

stead of a necessary evil, the cost of its maintenance can be made a profitable proposition. It is sometimes difficult, however, to obtain men who will give the lamps conscientious attention.

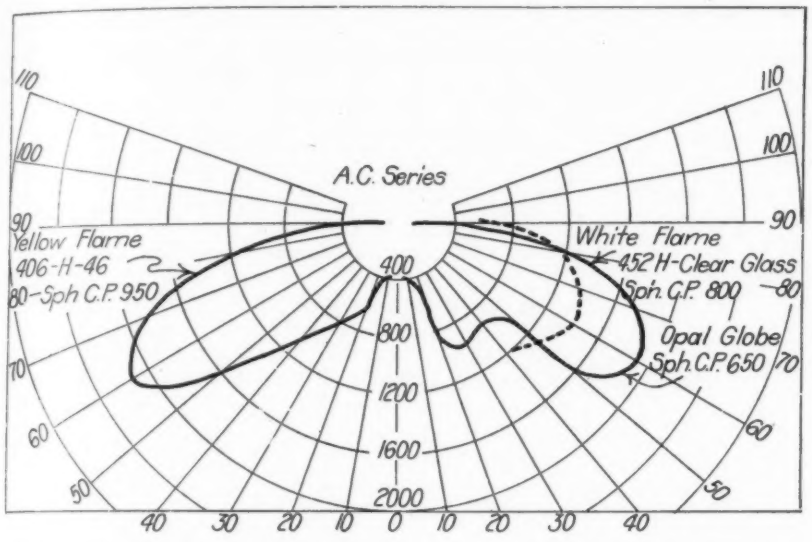


Fig. 2.—Alternating-Current Series Street Lamp with Clear and Opal Glassware.

The demands for responsible maintenance men are exorbitant in some cities—so much so that the constant friction engendered has been allowed to weigh against the broader use of this type of lamp. Under these conditions complaints have sometimes arisen which, on investigation, have proved to be in no degree attributable to the lamps themselves or to the carbons.

A so-called disadvantage of the white flame lamp is the bugaboo of globe deposit. A quotation from the report of the electrician of perhaps the largest flame arc installation in the country will suffice to show how greatly this fear of globe deposit has been exaggerated:

"The arc showed a 6 per cent decrease in candlepower at 15 degrees below the horizontal after being in service one trim. The subsequent deposit upon the slight initial etching of the inner globe was easily removed; and there was no further decrease in candlepower at the end of the third trim.

"The following values of candlepower are the average of 100 readings taken at 15 degrees below the horizontal with the lamp rotating at four revolutions per minute, and with an average terminal pressure of 55 volts. (Note—15 degrees is not the position of maximum light emission.)

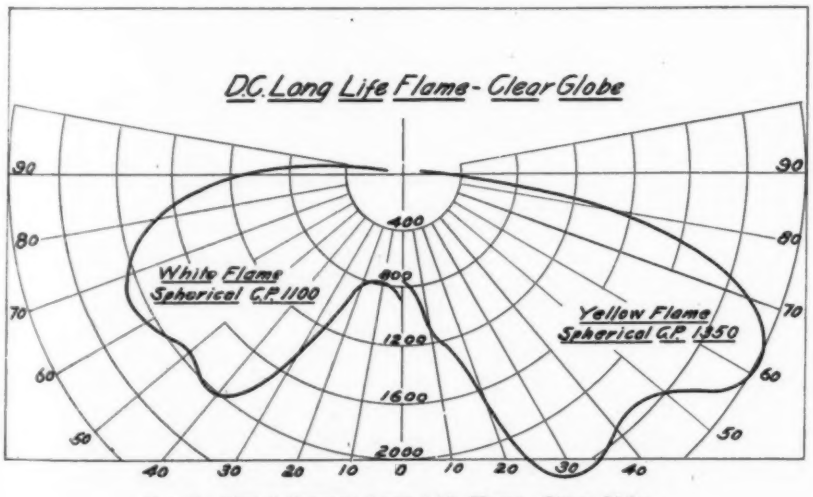


Fig. 3.—Direct-Current Long-Life Flame—Clear Globe.

Conditions.

New clear inner globes, line Alba outer globes; new National carbons, 1,055 candlepower; same equipment near end of first trim, globes undisturbed, 987 candlepower. Same equipment near end of third trim with globes cleared as well as possible, 997 candlepower.

"At the end of the first trim an indelible etching[1] of the inner globe had taken place; but this had very little effect on the candlepower as the etching was concentrated at the lower point of the globe; and therefore was not in the path of the light at the angle used. At the end of the third trim there was a heavy deposit over practically the same area as the etching at the end of the first trim; but this deposit was easily removed with a dry cloth, leaving the inner globe in the same etched condition as before."

Many actual service tests performed by the company in which the writer is employed, indicate that properly maintained lamps, even under the most severe operating conditions will not drop more than 20 per cent within six months, including the fresh deposit remaining in the lamp at the end of the last trim. Experience has shown that when the loss of light due to deposit exceeds an equivalent energy cost of 30 cents, it is economical to replace the globe. In general, this is necessary two or three times a year.

In Fig. 1 is shown the distribution curve of an alternating-current series white flame lamp, fully equipped with heavy opal glassware for "white way" lighting. The globe has distorted the natural distribution to some extent, throwing more light closer to the horizontal. It has been suggested that refractors be used, which, while lowering the total available light some 10 or 20 per cent will redirect some of the lower rays in a direction still more nearly horizontal. Under these conditions a beam efficiency of 15 degrees below the horizontal of 0.14 watt per candlepower can be obtained.

Fig. 2 shows these alternating-current series street lamps with clear and light opal glassware, where the inherent good distribution is evidenced. No flame arc is as intrinsically efficient on alternating current as on direct current, a fact immediately apparent by a comparison of Fig. 2 and Fig. 3. Below is a table, taken like the above distribution curves, from lamps in actual service, which represents the efficiencies of the flame lamp ordinarily used in street lighting practice.

Yellow Flame Lamps.

For lighting of large areas, where utility is the first consideration, the

1 This is an irridescent effect rather than a true etching.

TABLE I.
Long Life Flamers—Clear Glassware.

	White.		Yellow.	
	A.C. Series.	D.C. Mult.	A.C. Series.	D.C. Mult.
Arc watts	385	425	385	425
Terminal watts	450	715	450	715
Terminal watts÷Maximum bear C.-P.	0.225	0.325	.195	.223
Terminal watts÷M.H.S. C.-P.	.281	0.325	.236	.265

yellow flame arc has no equal. This fact is attested to by the great number of installations in railroad terminals and yards, docks, piers, and industrial establishments. The claim of the carbon manufacturers that this light has superior smoke and dust penetrating properties is corroborated by many of its users. Its color is oftentimes an advantage, since it is a well known fact that the eye is most sensitive in yellow light, except at very low intensities.

Searchlights.

The war raging in Europe has amply demonstrated the necessity of high power-searchlights in warfare. More work has been done, in consequence, on the carbons for these lamps during the past year than on probably any other. A distinct departure from past practice in the operation of searchlights has been the employment of very greatly increased current densities through the use of smaller negative carbons. By this means, greater candlepower is developed and less light is trapped between the carbons.

A new type of searchlight has recently been developed along entirely new lines. Instead of utilizing pure carbon electrodes in both lamp terminals as formerly, the positive is made of a small carbon tube filled with a white flaming material. Due to the enormously high current density at which this lamp is operated (600 amperes per square inch), a small pocket is formed at the positive crater, in which the volatilized flaming material is maintained at an intense heat, and is correspondingly highly luminous. In this lamp a maximum candlepower of 85,000 is obtained at 45 degrees without a reflector. (See Fig. 4.)

Projectors for Stereopticon and Moving Picture Machines.

It apparently required a war, cutting off foreign carbon shipments, to convince the moving-picture operators that American carbons are as good as, if not better than, the foreign article. Rather unsatisfactory in the early stages, projectors were the source of endless experimentation and expense by domestic manufacturers until no carbon satisfying the need of the country was obtained. Now that foreign carbons are nearly unobtainable, we are awakening to the fact that we have at our very doors a product just as satisfactory in every way at a lower cost.

The most recent advance in this field has been the substitution of special flame carbons on alternating-current circuits. These have been found to operate noiselessly, entirely eliminating the annoying humming of the old carbons. The life obtained is practically the same, but 15 to 20 per cent more power is required to operate them for equal candlepower. The light from these carbons is at the same time soft and non-glaring.

Photographic Lamps.

A most promising new field for the arc lamps appears to be that of photography. For this purpose the carbon manufacturers have developed a white flame carbon of high efficiency and remarkably good color, which has proved satisfactory in every way. It has found especial favor among the profession on account of its speed, cheapness and reliability in duplicating results. It was first used in photo-engraving establishments, especially for newspapers, where intense light and high speed are reqisites, and has since been widely used for blue printing, etching and copy work. Rather extensive comparative tests between flame and enclosed arc carbons were made and published by the writer about a year ago. These showed that at the photographically low current of 13 amperes, the two arcs were equal in photographic intensity, but at 25 amperes the flame gave double the actinic light of the enclosed at the same current, or six times the

Fig. 4.—New Flame-Type Searchlight Carbon.

power of the enclosed at its usual rating of 6.6 amperes on 110-volt direct-current.

Commercial photographers soon saw its value and employed it in their special photographic lamps. Its use is not confined to these lamps; any direct-current, enclosed arc lamp can be easily converted to burn flame carbons with an efficiency equaling that of these special lamps. The National Carbon Company has done much work along these lines and will be glad to offer any suggestions or advice as to how this may be done. For portrait work, the use of a suitable cabinet or screens enables the operator to obtain the best results.

Very recently a studio has been fully equipped with flame arcs, depending solely on them as a source of light. The proprietor is engaged in commercial and advertising photography, including advertising moving picture films. The service obtained from this studio has exceeded expectation, since daily commercial photographic problems are readily solved that under any of the old methods of lighting would have been exceedingly difficult.

An entirely new field is in the use of red flame carbons for special color work involving the photography of red objects, where the carbons have given much satisfaction. Orthochromatic and panchromatic plates are, of course, used. Other new developments in photography are the taking of moving-picture films by white flame arc light exclusively and the use of this same light source under special conditions in the making of photo-micrographs.

Special Uses.

The special developments in arc lighting belong almost exclusively to the white flame carbon. In textile industries the dyes are tested for constancy of color by exposing dyed cloth to sunlight for a certain length of time. With white flame carbons designed for the purpose, the same effect can be produced in from 10 to 20 hours as would require an exposure of 50 hours to July sunlight. It ordinarily requires two to three weeks to obtain this.

More or less allied to this subject is the manufacture of certain special chemicals requiring the action of strong light. This same carbon has proved to be vastly more powerful than any other light source, including daylight. Any further mention here would encroach upon a detailed paper soon to be published covering this work.

The men who are most closely in touch with the arc lamp situation prophecy that great strides in the art of illumination will be made in the near future through arc lamps, far surpassing in magnitude any of the more recent developments in other light sources. Even now, new spheres of usefulness are being discovered almost daily for the flame arc lamp and its adjunct, the carbon electrode.

Noise and Smoke Nuisance in Philadelphia Subway Excavation Will Be Avoided by the Use of Electricity.

In spite of the fact that the excavation of the City Hall section of the Broad Street subway in Philadelphia, which will be started September 13, will necessitate the use of large shovels, dredges and derricks both day and night, the occupants of the office buildings and stores in the neighborhood scarcely will be disturbed by their operation. Transit Director A. Merritt Taylor has stipulated with the contractor that all such machinery must be electrically operated, which means the virtual elimination of the noise and smoke nuisance invariably associated with steam derricks and dredges. The use of the latter during the building of the Market Street subway caused great complaint, office work being interrupted by excessive noise, and buildings blackened by smoke.

The practicability of the use of electric power in digging and dredging work was demonstrated on the contract for the relocation and reconstruction of sewers for the delivery loop.

MODERN ARC LAMPS.

By C. E. Stephens.

Engineer, Westinghouse Electric & Manufacturing Company

The development of the modern arc lamp has been characterized by more activity, more radical innovations, and the way has been strewn with more relics than almost any other type of electrical apparatus. At some periods development has been retarded for decades, while at other periods, progress has been made with rapid strides.

Many histories of arc-lamp development have been published. Assuming, therefore, that the various steps in the development of the modern arc lamp are reasonably well known, we shall give here some of the more important details of construction, and performance of two modern types, viz., the metallic flame and the flame-carbon arc lamps.

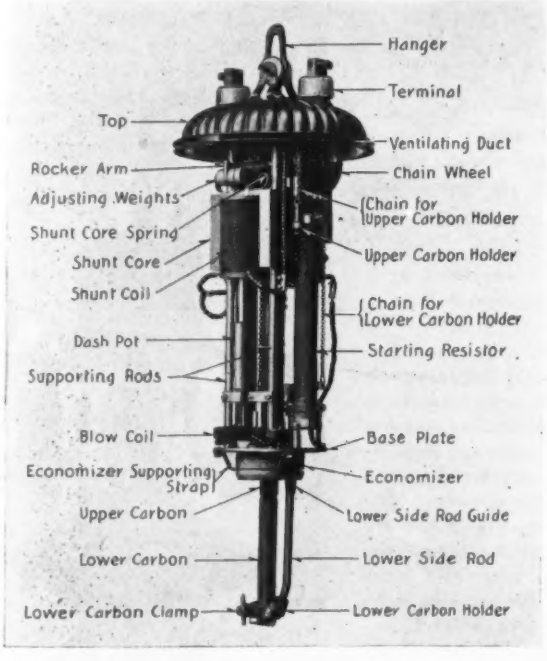


Fig. 1.—Mechanism of Flame-Carbon Lamp.

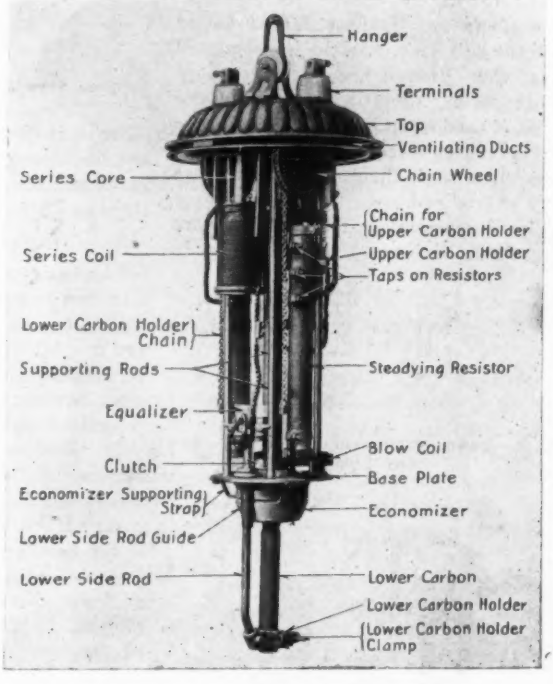


Fig. 2.—Flame-Carbon Arc Lamp Mechanism.

General Theory of Lighting.

The earliest historical form of illuminant is the flame. The heat of the flame comes from the union with oxygen of the various compounds in the combustibles. In every flame some of the compounds are in a gaseous state. Solid or liquid combustibles are broken up by the heat of combustion into solid and gaseous compounds. If enough air is mixed with the gas formed all the combustible compounds are rapidly consumed and a non-luminous flame results. Thus the alcohol flame is merely non-luminous, as are also the flames of the oxyhydrogen and the Bunsen burners. If there are more solid compounds in the combustible than the air supply will burn rapidly, these solids will burn more slowly, and will, therefore, glow, thus the light given off from a burning piece of wood or a tallow candle. A non-luminous flame can be made luminous by the introduction of some foreign substance. If a piece of copper wire is held in a Bunsen gas flame it becomes heated and a green flame results. The Welsbach gas burner uses this principle.

If the substance being heated is of a certain character a combination of colors is obtained that produces white light at the proper temperature. If, however, the substance be some of the known metals certain of the colors will be more pronounced; that is, not all substances give off the same color when heated to the same temperature in a flame. In the Welsbach burner certain metallic compounds are spread upon a thin web of heat resisting material. These compounds, when heated to the high temperature of the gas flame, give off a much greater amount of light than would be given by the carbon particles.

Arc Lamps.

If two pieces of a conducting material called electrodes be connected in an electrical circuit of sufficient voltage, with the ends touching, and these ends be then separated slowly, an electrical spark will be seen between them. When the electrodes are pressed closely together the contact between them is good and the electrical resistance at the point of contact is relatively low, but when they are separated slightly contact is made through a few minute projecting points of the electrode; these, because of their high resistance, become very hot. The intense heat causes the points of the electrodes to change into vapor, and the vapor, which is conducting, bridges the gap between the electrodes, and current follows. As they are separated farther the bridge of conducting vapor called the "arc stream," follows and the arc is formed.

Flame-Carbon Arcs.

It has been mentioned that the arc stream supplies very little of the light of an arc lamp and that the energy consumed in it is therefore lost. Non-luminous flames can be made luminous by the introduction of some foreign substances. In the later forms of arc lamps this has been accomplished by

impregnating the carbons with some mineral salt. The light from the arc stream of the carbon arc is purplish in color, but since it comprises such a small proportion of the total light from the lamp its effect is scarcely noticeable except when colors are being matched. If salts of metals such as sodium, strontium, barium, titanium and calcium are introduced into the carbons when the electrodes become vaporized into the arc stream, some of these salts will also be vaporized into the stream. This makes the arc stream luminous. The different salts give different colors; thus copper gives green; sodium gives yellow, and strontium gives scarlet. While white light is the most desirable for illumination the penetrating qualities of the white light are not as good as of yellow, and hence is not used to any great extent except for street lighting. Lamps that use impregnated carbons are called flame-carbon lamps. The efficiency of these lamps varies with the salt used. As the impregnated salts when burned are converted into solids again, they deposit upon the globe, if used in an inclosed arc. Hence the flame arcs were formerly inherently open arcs and their electrodes were very short-lived.

The long-burning flame-carbon arc lamp is so designed that the fumes do

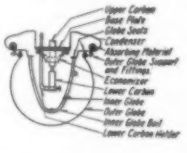


Fig. 3.—Lower Mechanism of Flame-Carbon Arc Lamp.

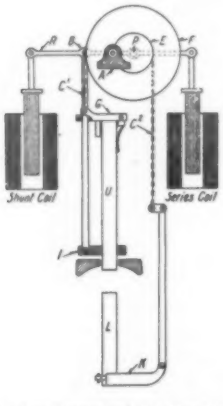


Fig. 4.—Focusing Mechanism.

not condense upon the part of globe surrounding the arc, but the lighter fumes rise and are deposited in a condensing chamber located just above the globe, while the heavier fumes are deposited upon the lower part of the globe. Practically none of the light is absorbed by the globe, and the light distribution is very even. The lamp is almost entirely inclosed and the carbons have a life of about 130 hours.

Application.

The flame-carbon arc lamps are adapted for all standard commercial circuits. They give excellent and effi-

Fig. 5.—Flame-Carbon Arc Lamp.

cient light distribution for streets, park and boulevard lighting, and for railroad yards and other large open areas where large candlepower units are best suited.

General Construction.

The flame-carbon arc lamp is divided into two compartments, separated by a strong base plate, as shown in Figs. 1 and 2. All the regulating parts of the mechanism are in the upper compartment and the arc is in the lower, which is again subdivided into two chambers.

In addition to forming a separation between the upper and lower compartments the base plate supports all the parts of the lower compartment. The lower compartment consists of the arc and the condenser chambers, and the enclosure between the outer and inner globes. (Fig. 3.) These sections must be practically air tight in order to secure a long carbon life. The arc chamber is formed by the inner globe seating accurately on the surface of a casting forming the outer rim of the condenser. The fumes from the arc rise into the condenser chamber, where the solid matter is deposited, and the gas freed from suspended substances. Sticks of consuming material for absorbing the glass-etching gases of the arc are placed in the condensing chambers.

The lower compartment also contains an inverted piece of heat-resisting material above the arc which is called the economizer. This piece shields the upper part of the lamp from the heat of the arc, provides a suitable pocket for the heated gases, and offers a good reflecting surface.

On the base plate of the lamp is fastened a blow coil, which generates sufficient magnetic field to neutralize the blowing effect on the arc caused by the current passing through the side rod. As the blow magnet is in series with the arc, the blowing effect will be practically neutralized though the current may vary.

Mechanism.

A mechanism is required to feed the carbons in o der to obtain constant and reliable operation and to regulate the arc length. A long-burning lamp requires a mechanism that will feed the carbons very slowly. It is also desirable to provide a focusing mechanism, which feeds both carbons at such a rate that the arc is kept approximately a constant distance below the economizer. This is accomplished by attaching the chains leading from the upper and lower carbon to wheels having different diameters. Fig. 4 shows this arrangement diagrammatically on a series lamp with only one set of wheels, chains, etc., shown.

Regulation.

Regulation of the arc is obtained by the use of the rocker arm principle, changes in voltage and current turning the rocker arm about the fulcrum *A*, Fig. 4. It is of great importance that

Fig. 6.—Lamp with Globe Lowered and Mechanism Covers Open.

there be a minimum friction during the regulation. This is accomplished by eliminating the usual guide rods for the upper carbon holder and using the clutch rod for this purpose. Referring to Fig. 4 it will be noted that the upper carbon holder *G* is guided by the two clutch rods. There is no relative motion between them, because the clutch rod, when dripping the carbon is moved by this see-saw action at

TABLE I.

Lamp.	Amperes at Terminals.	Globe. Outer.	Globe. Inner.	Volts. Arc.	Volts. Terminal.	Watts, Terminal.	Power Factor Terminal. Per cent.	Electrical Efficiency Lamp, Per cent.	Curve.	M. L. H. Candlepower.	Watts per M. L. H. Candlepower.	M. S. Candlepower.	Watts per M. S. Candlepower.
A.C. Series	10	Clear	Clear	49	55	445	81	88	A	1400	0.317	769	0.58
A.C. Series	10	Alba	Clear	49	55	445	81	88	B	890	0.5	630	0.70

the same time the carbons are regulated. Feeding of the carbons occurs when, due to carbon consumption, the clutch rod has been lowered enough to cause the clutch to assume a horizontal position and to rest on the economizer. This releases the grip of the clutch on the carbon. The carbons then come together until the shunt coil is sufficiently weakened to allow the series coil to pull the clutch rod up so that the clutch grips the upper carbon again.

Fig. 7 shows a typical distribution curve for this type of lamp and table I. shows the electrical performance of the series burning lamp for alternating-current circuits.

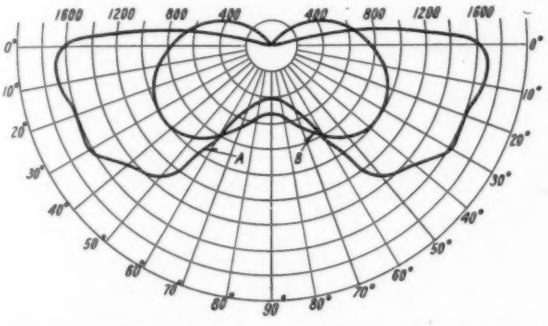


Fig. 7.—Distribution Curve of Flame-Carbon Arc Lamp.

The flame-carbon arc lamp represents the latest development in high candlepower light sources. From the standpoint of the illuminating efficiency, maintenance cost and superior lighting effect, the flame-arc lamp stands well above any other type of illuminant.

Metallic-Flame Arcs.

The metallic-flame arc combines the principles of the carbon arc and the flame-carbon arc and gives light from both the arc stream and the electrodes. In this type of lamp the positive electrode is a metallic button and the negative electrode is a rod made of metallic oxides. The resistance of these oxides is comparatively high, and for this reason a metal wire is inclosed in the oxide electrode. The metallic-flame arc differs from either the carbon or flame-carbon arc in that in the metallic-flame arc the negative electrode is hotter and burns away faster, while in the carbon and flame-carbon lamps the reverse is true. The metallic-flame arc lamp will operate on direct current only.

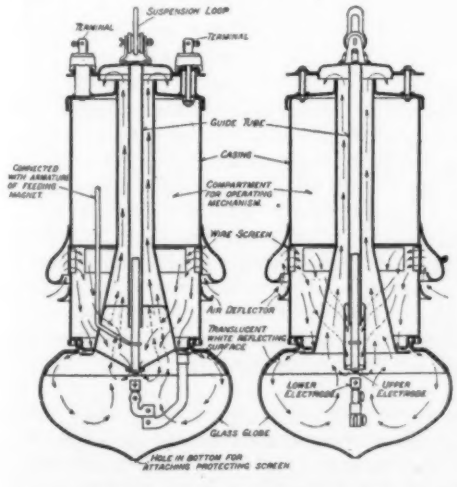


Fig. 8.—Diagram of Metallic-Flame Arc Lamp.

Theory of Metallic-Flame Arc.

There is no carbon used in the electrodes of the metallic-flame arc. Iron oxide, when projected in the arc stream forms a conducting path through which current will pass even more readily than through carbon paper. So iron oxide is used to supply this conducting path. However, an electrode of iron oxide, although giving a stable arc, does not furnish a very bright one, and some other material must be employed to make the arc more efficiently luminous. Oxides of titanium serve this purpose. These have a tendency to volatilize very fast and hence tend to decrease the life of the electrode. An oversupply also tends to make the arc unstable. An oxide of chromium is, therefore, added to prevent the electrode from wasting away so rapidly. From the foregoing it is seen that to give proper service a combination of these three materials must be used that will give the best results, considering efficiency, stability, satisfactory operation, and life of electrode.

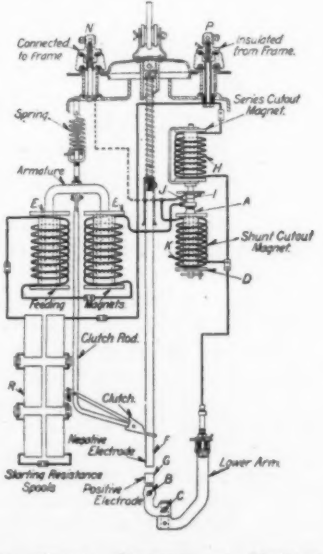
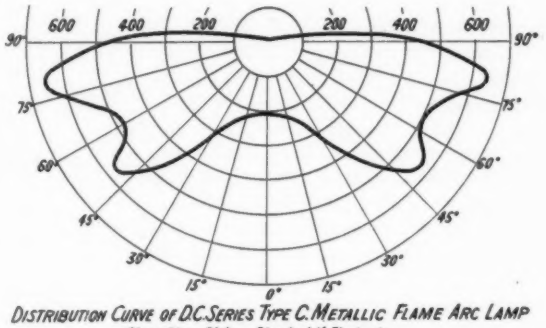


Fig. 9.—Circuit Diagram of Metallic-Flame Arc Lamp.



DISTRIBUTION CURVE OF D.C. SERIES TYPE C. METALLIC FLAME ARC LAMP
Clear Glass Globe Standard Y Electrode
Amperes 4

Terminal Volts	68	M.L.H.C.P.	495	M.S.C.P.	250
Arc Volts	66	M.L.H.C.P. per Watt	1.82	M.S.C.P. per Watt	.92
Terminal Watts	272	Watt per M.L.H.C.P.	.55	Watts per M.S.C.P.	1.09

Note. Lamp was burned 36 hours before test was made

Fig. 10.—Distribution Curve of Metallic-Flame Arc Lamp.

As only the negative electrode is consumed while the positive is consumed very little by vaporization, it is customary to use these oxides in the negative electrode only and to make the posotive electrode small and of a combination of iron and copper.

The products of combustion from the arc, due to the oxides projected into it, are gases and a fine powder. Some of the gases will condense, and, together with the small solids, will deposit upon any cool surfaces with which they come into contact. It is necessary, therefore, to in some way remove the fumes and soot from the lamp. The method of doing this is shown very clearly in Fig. 8. The mechanism of the lamp is shown in Fig. 9.

Referring to Figs. 8 and 9 it will be noted that the normal position of the electrodes when the lamp is not burning is separated. This is necessary because of the tendency of the electrodes to fuse together when they come into

contact. Use is, therefore, made of the shunt-feed type of mechanism, as shown. When the lamp is connected properly in the circuit, current will flow from the positive terminal *P* to the starting resistor *R*, and the windings of the feeding magnets *E*, and thence through contacts *J* and *I* to the lamp frame. The negative terminal is not insulated from the lamp frame, so that the circuit is then completed. These feeding magnets pull down their armature. The clutch rod is attached to this armature, and when the armature is pulled down the clutch rod is lowered so that the clutch releases its grip on the negative electrode *F*, letting the two electrodes *F* and *G* touch. Current now flows from *P* through the series cutout magnet winding *H* to the lower electrode *G* to the upper electrode *F*. Neither this electrode nor the negative terminals are insulated from the lamp frame, so that the circuit is then complete from the upper electrode to the negative terminal through the frame. The series cutout magnet is thus energized and lifts the series cutout contact *I* away from the shunt contact *J*, thus opening the circuit through the feeding magnets, and their armature is released. By virtue of the spring attached to the feeding magnet armature the clutch is then raised. It grips the negative electrode and draws it away from the positive, thus establishing an arc. The negative electrode is held in this position until it is burned away so much that the arc lengthens enough to cause the shunt magnet *K* to become energized sufficiently to lift the shunt cutout contact *J* until it touches the series contact *I*. Again current flows through the feeding magnets, and the feeding operation is repeated. This cycle is repeated throughout the life of the electrode.

The light distribution from this lamp is shown in Fig. 10, and the electrical performance is given in Table II.

TABLE II.

Four-Ampere Lamp.

Terminal volts	68
Arc volts	66
Terminal watts	272
M.L.H. C.P.	495
M.L.H. C.P. per watt	1.82
Watt per M.L.H. C.P.	.55
M.S. C.P.	250
M.S. C.P. per watt	.92
Watts per M.S. C.P.	1.09

Note—Lamp was burned 36 hours before test was made.

Application.

This lamp is particularly well adapted for street illumination, yard lighting and such other areas where a smaller light source is better adapted than that of the flame-carbon lamp. The lamp has a very low operating cost, the color of light is more nearly white than any other light source, and the distribution is such as to make the lamp well suited for illuminating large areas.

The arc lamp more than any other piece of electrical apparatus is very dependent upon allied branches of engineering. The carbon industry, the manufacturing of porcelain, of glass, of alloys of all kinds, and the production of various chemicals all have had a controlling influence on the development of the arc lamp. In spite of the many factors which require consideration the arc lamp has become a very important piece of electrical apparatus, and there is reason to expect continued development in the future as in the past.

Features of Important Swedish Hydroelectric Plant.

The Gullspang Hydroelectric Power Station is one of the most important in Sweden, and was at its completion the largest working concern of the kind. The Gullspang River is, next to the Klara River, the largest of the streams having their outlets into Lake Vänern. Prior to reaching this lake, it passes Lake Skagern, the river distance between the two lakes being about eight miles, and the level of the latter lake being about 79 feet higher than that of Lake Vänern. There are two falls—the Gullspang Fall, or rather rapid, which, over a distance of five-eighths mile, has an aggregate height of about 69 feet, and the Aras Fall, of about 11.5 feet height.

The combination of the two falls in one power plant was advantageous, inasmuch as the Munkfors Fall has no reservoir, whilst the Gullspang Fall has the already-mentioned Lake Skagern, with its (through regualtion) unlimited possibilities for storage. By the aid of certain regulating works the Gullspang power station could be planned for more than 3,600 cubic feet of water per second, although the average volume of water may not exceed 2,520 cubic feet per second, and the low-water volume has been as little as 972 cubic feet per second. The smallest quantity of water that will be available after the regulation of Lake Skagern, and its damming up to its present high-water level, has been calculated at 1,520 cubic feet per second, 108 cubic feet being reserved for the passing of fish. There is at present no timber-floating in this river. By the further regulation of some lakes higher up these figures may be raised.

It was first proposed to construct a solid dam, which, slightly arched against the water, should span the river between the two rocky banks; but when the place had been laid dry it was found that the rock bottom in the center was 26.5 feet below the river bed, and the proposed dam, if carried down to the firm rock, would consequently prove very costly. The construction was therefore altered, and a straight solid dam was built on the western shore, and across the western half of the river bed.

The power station, with its three stories, is located in a cavity blasted in the rock to a depth of 32 feet below the surface. The outer walls of the buildings are entirely free of the surrounding rock, so as to avoid, as far as possible, dampness in the machinery hall. On the bottom floor, which rests on the rock, the electric generators are installed, direct-coupled to the turbines, under which, in the longitudinal direction of the power-station, is formed the outlet tunnel, into which are taken the pipes from the turbines. These suction-pipes are cast into strongly reinforced-concrete beams, which have to sustain the pressure from the plate cylinders and from the volume of water in and above these. The lower ends of the suction-pipes are also encased with concrete so as to protect them from rust.

The outer walls of the bottom story of the power-station are made entirely of concrete. The wall towards the turbine chambers is built with a number of arches, supported by the intermediate pillars, and having the rock for outer support. The outer walls are made of reinforced concrete, and there is efficient provision for ventilation through openings to the respective turbine chambers, and ample exit through windows, etc. The transformers and high-voltage instruments are installed in the second story, and further instruments in the third story. The beams and floors are of reinforced concrete.

The exciting turbines are placed in insulated vertical plate-cylinders, of 6 feet 6.75 inches diameter, to which the water is led from the distribution basin through horizontal pipes of 3 feet 3 inches diameter. Opposite the exciting plant there is a lower two-storied structure, along the longitudinal wall of the power station, which contains the necessary low-voltage appliances, the switchboard forming the partition wall between the upper story and the machinery hall.

The power-station is at present built for four units, but the east-end wall is only a temporary one, made of wood. The distribution basin has, however, been designed and the blasting work carried out with the final capacity in view, so that extensions can be undertaken at any time. The power-station and the distribution basin are also placed sufficiently low to allow of a future junction with the Aras Fall, which will then be removed by blasting.

The first three units each have a turbine-shaft capacity of 4,000 horsepower, the fourth of 4,500 horsepower. The capacity of the exciting units is 200 horsepower for each.

HOW IS BUSINESS?

In Response to an Inquiry directed to a number of Leading Electrical Supply Jobbers and Manufacturers of Electrical Material, regarding the Present Situation in the Electrical Industry and the Outlook for Business for the Fall and Winter of 1915, a Number of Interesting and Instructive Replies have been received. Those Published below, because of their Authorship, need no Comment!

Undoubtedly the eastern section of the country is beginning to feel a decided impetus in business activity. Much of the increased employment and consequent encouragement of manufacturers generally is undoubtedly the result of many plants now being actively engaged executing orders for materials of warfare. However, there is a pretty general feeling that conditions warrant a greater expression of optimism and a more decided cheerfulness than has been possible for some time.

Among the Eastern Jobbers.

Commenting on the situation, B. H. Ellis, vice-president of the Manhattan Electrical Supply Company of New York, may be quoted as follows:

"We fortunately have not suffered from any loss of business but have been showing a steady increase all the while.

"While our raw materials have greatly advanced in cost, and there is some little hardship in obtaining our needs, with the necessary advance in the selling prices, this does not seem to restrict the buying in any respect. It is true that in some other lines there seems to be some business depression, but generally speaking, conditions are very satisfactory to us and we are looking for steady improvement."

Covering much the same territory, Frank H. Stewart, the well known proprietor of the Frank H. Stewart Electric Company, Philadelphia, Pa., has the following to say:

"Present conditions show a fair improvement over last year. The future outlook is one of continued improvement. Where business is not hampered or accelerated by war conditions it will in my opinion steadily increase until it reaches the normal level, and possibily a business boom if political conditions favor it."

The Pittsburgh District.

Coming further west to the Pittsburgh district, conditions appear better than usual, and the following expression of opinion from Thomas M. Cluley, sales manager of the Union Electric Company, Pittsburgh, Pa., is very reassuring:

"While present business conditions are not entirely satisfactory, they offer such a big improvement over what we have had for some time that we are very much pleased. A large share of our business is with the coal mining companies and the industrial plants. The industrial plants are all busy and many of them are building additions to their works. This, of course, makes business for us and gives a better outlook to the coal companies which makes business for us.

"I must admit that most of the industrial plants who seem to be busy are working on war orders. Just how much business they have which is not brought about by the unfortunate European war in one way or another is very problematical.

"We have enough confidence in both the present and the future to maintain our entire force and to carry our maximum amount of stock."

Chicago and the Middle West.

Chicago, representing a considerable part of the distribution of electrical material for the entire country and certainly a barometer for the great middle west, has suffered not only from a depression due to our international affliction, but local strikes for some considerable period during the latter part of 1914 and the first half of 1915, which have contributed to a decided negative situation. It is interesting, therefore, to note the cheerfulness of so keen an observer and at the same time so conservative a spirit as George A. McKinlock, president of the Central Electric Company, Chicago, Ill., who says:

"The electrical supply business is very sensitive to the changes and fluctuations in general business, while at the same time it is one of the most stable lines of business. We are now approaching a season when there will be more incandescent lamps used than at present and fewer fan motors; therefore the idea that the sale of incandescent lamps should increase is sound. The war and rumors of war have set in motion the wheels of many manufacturing plants that were built for other purposes than the manufacture of war munitions. This has caused a demand for supplies that otherwise would not have been felt and therefore the supply business is indirectly influenced by the war. The manufacture of machinery necessary to build automobiles has very much increased certain lines of business which also favorably affects the supply business. The good crop reports assure a large, bountiful and valuable harvest. The question of cotton is uncertain. Great distress exists among the unemployed and their dependents. The necessity for practicing economy was never before so urgent.

"Under all these conditions, with our international and Mexican relations so clouded, it is difficult to predict the business results of the season we are entering; nevertheless there is a rising feeling of confidence exhibited that expresses a distinct change for the better in the general outlook."

Speaking for much the same territory and of equal interest, is the expression of opinion contributed by L. A. Schwab, president of the Monarch Electric and Wire Company, of Chicago:

"There is little, if any, improvement in the volume at this time. Of course, in speaking of volume, we speak of profitable volume. There is, no doubt, quite a large amount of business which is being placed at no profit, and it is being taken by some jobbers and manufacturers, who seem to have but one idea, and that is to get business regardless of profit.

"The situation here has cleared considerably, on account of the settlement of the building strike, while in the territory outside of Cook County inquiries are more numerous. A better feeling seems to prevail in certain parts and in others it is very quiet. What the future has in store for us in the electrical business, it is hard to predict. We read a great deal in the daily press about prosperity being here. Well, it sounds good, but it is like the story of the banker; go to him and ask him for his opinion on conditions, which you desire for publication, and he will tell you business is good, but ask him for his private opinion and he will have a different story.

"Nevertheless conditions are bound to improve, but just when it is hard to say. Every day draws us nearer to it, however. When it does improve it will do so gradually and without any

boom, until our country will be prospering beyond anything ever thought of. This will come when all of our unemployed are working, when our employed are receiving fair pay, when merchants and manufacturers alike will receive a fair profit on their goods, and when each employer and employee are receiving full value for their dollar."

Louisville and the Valley.

Still confining our survey to the valley portion of the country, we get an insight into conditions toward the southland from a recent letter from J. L. Daeuble, secretary of the Harry I. Wood Company, of Louisville, Ky.:

"At the present time business is below par, although there seems to be a little increase over the previous months. Of course, as you probably know, the state of Kentucky has just gone through a primary election, which was of interest to all business men. There were two platforms: State-Wide Prohibition and County Unit, and according to this election the County Unit was favored exclusively. But it now lies for the regular election to tell just exactly which will win it.

"Of course all business men are waiting for the November election. The distilleries, breweries, etc., are waiting for the regular election before deciding to make improvements.

"If the 'wets' win I believe business will be a great deal better. The distilleries and breweries have let the repair work in their plants run on for some time until they know just where they stand."

In the Southland.

Going further south, conditions in Tennessee, Mississippi, Arkansas and Louisiana are sized up briefly, and, according to W. R. Herstein, secretary and treasurer of the Electric Supply Company, Memphis, Tenn., there is hope for improvement immediately, although the conditions have been unfortunate:

"While this section of the South is still heavily handicapped by reason of existing conditions, a slight but continuous improvement is thoroughly perceptible.

"I have, during the past two months, traveled extensively throughout Tennessee, Mississippi, Arkansas and Louisiana, and the size of the corn crop is strikingly apparent. In my opinion corn and cotton acreage in this section will be almost evenly divided and if this ratio is carried out throughout the entire South, a relatively high price of cotton is bound to ensue. The vast increase of corn acreage indicates that not only will the southern planter be beyond the necessity of buying corn for his cattle, but he will have corn to sell, as well as cotton. If this production is realized, a considerable portion of the South's old-time prosperity will doubtless return.

"Our other large industry, lumber, shows but slight improvement and the return of prosperity will be tempered by this disadvantage as long as ocean freight rates remain at their present high figure."

Respecting the Southland, also, there is no one better informed nor more enthusiastic in the electrical business than Col. C. Robert Churchill, president and general manager of the Electric Appliance Company, New Orleans, La. From his point of view:

"Things in the South have not mended materially, and industries everywhere are still suffering from the effects of the European war.

"Here and there we see little rays of hope, but they are the exception and not the rule. The lumber mills, on which we depend for a great deal of our business, are not turning out over 45 per cent of their normal output, and the price of cotton being still low, it does not give us any great amount of hope for the immediate future.

"Naturally, the electrical supply and automobile accessory businesses feel this the worst.

"Still, we are very hopeful. The past two or three months have been very good ones with us, and we are not complaining, but are working, working, working, all the time, and leaving no stone unturned."

The Northwest.

Coming now to the northwest, B. B. Downs, president of the St. Paul Electric Company, St. Paul, Minn., says:

"We find that at the present time, business to be in a healthy conditions, volume normal, and with the largest crop of small grain, the harvest of which is practically assured, in the Northwest. The prospect for the future is particularly bright, and we are looking forward to a very large fall trade."

Another active electrical man, J. M. Hannaford, Jr., manager of sales of the Northwest Electric Equipment Company, of St. Paul, Minn., contributes some interesting suggestions. He says:

"I have just returned from a western trip and the crop conditions in the two Dakotas and Montana look very fine. We cannot make a prediction as to the outlook of the immediate future, because of the fact that things are in such an unsettled condition that no one knows just exactly what will happen. If this were a normal year, we should have a very good fall business because the crop is certainly a good one; prices are right this year and there should be a great deal of prosperity in this section of the country.

"One thing particularly interesting to me on the trip is the fact that in western Minnesota and a number of portions of North Dakota, the farmers are forming community sub-stations and securing electric power from the transmission lines which are being run along the highways. Where a farmer cannot reach such a line, he is buying his own isolated plant. The number of farmers who are today doing all their work on the farm with the aid of electricity is surprising."

According to A. W. Lindgren, general manager of the Northern Electrical Company, Duluth, Minn., there is much to look forward to. Mr. Lindgren states:

"This section of the country has perhaps been somewhat more fortunate than many others, in that so far the volume of business has been fully as good as 1914. Since, however, other sections have been harder hit than we, they have gone after business with more effort, and this in turn has forced us to make greater effort to retain the business which we have, besides endeavoring to get new business.

"In the early part of the year all business practically was at a standstill, but gradually greater confidence was acquired and this in turn had a correspondingly good influence on general business conditions, until now nothing short of a national calamity would be able to stop the onrushing wave of prosperity and good feeling.

"With respect to financial conditions, money has been very scarce, and it has been somewhat harder to get collections than previously, but this condition also is greatly improving.

"The outlook for the immediate future is bright and I firmly believe that the balance of 1915 will be fraught with a good measure of prosperity for the electrical trade.

"Looking backward, it would appear that the general rise of prices of commodities entering into the manufacture of electrical goods has not had very much effect in curtailing business."

Among the Manufacturers.

Among many of the manufacturers the situation is viewed with equal confidence. Indicative of the general sit-

uation in the East, C. P. LaShelle, vice-president of W. R. Ostrander & Company, writes:

"For the past year, our company has enjoyed a volume of business of about the same value as the preceding year, with a difference, if any, in favor of this year.

"With the statement that we can detect the groundwork of a return to normal conditions, we are willing to waive a prophecy of the future to those experts who study general business conditions."

Mr. Herr Is Optimistic.

A valued and highly interesting commentary on the situation is furnished by E. M. Herr, president of the Westinghouse Electric and Manufacturing Company. Than Mr. Herr there is no one more capable of expressing an intelligent opinion of present conditions and the outlook in the electrical industry. He has himself only recently returned from an extended trip abroad and his intimate associates in the directorate of the Westinghouse Company have been making a careful analysis of our opportunities both in this country and in South America for some time. It is, therefore, with particular interest that Mr. Herr's views are presented at this time. Commenting directly upon the situation, he says:

"The present condition of the electrical manufacturing business is a steadily improving one. Some lines of our product show less tendency to increased activity than others. This is notably so in the electric railway field and also in the field of machinery and appliances for the equipment of large power plants.

"There is an abnormal activity in the industrial motor field, due largely to the considerable volume of war orders placed in this country recently, requiring large and improved shop facilities.

"The outlook is for a continued improvement with higher prices, owing to higher cost of materials, and I believe this tendency will be accelerated when the end of the war in Europe becomes evident.

"The large crops will no doubt stimulate the railroad purchasing and the electrical business should profit thereby."

More Optimism.

The opinion of C. E. Corrigan, vice-president of the National Metal Molding Company, Pittsburgh, Pa., is peculiarly appropriate at this time. Mr. Corrigan is not easily moved, and the caliber and interests of the man establish a genuine conviction for what he may have to say. Regarding present and prospective business his comment is as follows:

"There is a general feeling of optimism throughout the electrical trade in the United States with whom we have business transactions. For the last four months, building operations have not been up to the standard of the same period of last year, but the prospects are improving week by week and we feel confident because of prosperous conditions which prevail in the iron and steel industries that in the near future, this general revival of business will be felt in the electrical industry to a greater extent, and that by the last of this or the first of the coming year we will enter a period of unparalleled prosperity in the United States."

R. C. Lanphier, general manager of the Sangamo Electric Company, Springfield, Ill., has many opportunities for definite study of conditions in the electrical industry. His opinion, therefore, from which we quote, based upon the utilization of a product which forms a very good barometer of general conditions in the industry, is interesting:

"So far as we can judge, a great improvement is already taking place in general business conditions, and we anticipate during the fall months the largest meter business we have ever had. Some of this improvement is, of course, due to stimulation in many lines produced by so-called "war orders," but still more, we believe, by the anticipation of remarkable crops. As another factor, many firms are now, for the first time, going actively after export business, which in many cases will no doubt result in excellent increases in business."

The Electric Sign.

The electric-sign business is a good-times business. Notwithstanding the settled conviction upon the part of students of publicity and the psychological advantages of advertising, this most potent element of silent salesmanship is neglected when the pinch of necessity drives men to consider only the ordinary forms of business-getting media. The opinion of James M. Gilchrist, secretary of the Federal Sign System (Electric), is therefore timely:

"There is apparently a great deal of electric-sign business that will be released just as soon as general business conditions improve. Our salesmen report that there is a great deal of interest and inquiry in the various trades regarding electric signs and many people are asking for propositions which they receive with interest and then put by generally because they cannot afford to spend the money. Some of the big concerns are buying but the smaller merchants are holding back. The inability of the public-service companies to float bonds or stocks is having a decided effect upon the electric-sign business as well as the business in household appliances and similar current consuming devices. This inability to secure funds has led to the curtailment or entire stoppage of easy payment plans which are quite generally used to further this business. A good market for public-utility bonds and stocks will bring a revival in all of these lines of business. There is no question about the potential business in the various lines that we cover but general conditions must improve greatly before this potential business develops into actual orders."

A. W. Berresford, general manager of the Cutler-Hammer Manufacturing Company, Milwaukee, sees little uncertainty during the next 12 months and announces his conviction with regard to present conditions and the immediate future as follows:

"Our own experience is today that business is on a very much better basis; in fact, the present rate at which we are receiving orders is about normal for us.

"I have been very optimistic on the whole situation for a year and a half, and firmly believed that even had the war not taken place a marked increase in business would have made itself manifest at the end of the past year. The future appears to me to be bright, although should the war end in the near future there would unquestionably be a considerable unsettlement, which would mean a set-back for some months. This, however, does not seem to be the probability, and I can see no reason why the next twelve months should not mean good and increasing business."

The Southwest Will Be There.

An interesting commentary upon the above, and in answer to the same general inquiry, has been contributed by Charles A. Newning, editor of the *Southwestern Electrician*, Houston, Tex. Mr. Newning is in close touch with not only the electrical industry as its demands and opportunities have to do with the great southwest, but as publisher of the *Southern Industrial and Lumber Review*, is in a position to speak authoritatively with regard to conditions intimately affecting other industries upon which, to a great extent, the electrical industry is dependent for its prosperity. Mr. Newning writes as follows:

"In reply to your letter of 10th inst.

we beg to state that up to the point where the disposition of the cotton crop of this year, now reaching its full maturity, was clouded by the suggestion of an overt act on the part of Great Britain, the business of this section never looked better and electrical jobbers were preparing for a general renewal of demand. The improvement had already set in when this new threat was sprung and it has not been palpably checked as yet, but any attack on cotton is necessarily liable to cause a halt in general buying of all commodities. We think in consequence of the generally prosperous condition of southwestern farmers that the banks will be found willing and able to tide them over a possible depression but this does not include the funds necessary for general betterments.

"We regret to be obliged to advise you along these lines for while we ourselves are most optimistic and practically know that our section cannot be permanently hurt by the decline in the value of any crop, we are obliged to admit that this forms but a poor predicate for buying beyond current needs. In September we may be able to tell another tale."

Measure Earth Resistance to Electric Current.

Oil in sand or earth causes it to have a very high resistance to the electric current. Certain valuable ores in the earth cause it to have a very low resistivity. For any particular specimen of earth the resistivity varies with the moisture content. The damage to pipe systems on account of electrolysis by the return current of street-railway systems depends, among other things, upon the resistivity of the earth around the pipes and near the tracks. There are, therefore, many reasons why knowledge concerning the resistivity of certain very limited portions of the earth is desired.

In a recent publication of the Bureau of Standards, a method for measuring earth resistivity which is free from some of the faults of methods which have previously been used is described. The method is particularly adapted to those cases in which it is important that the measurement be made without disturbing the earth, as is necessary where a sample is taken into the laboratory for measurement, and in those cases where the mean resistivity of a fairly large portion of earth, extending to a considerable depth, is investigated.

An electric sign to advertise Georgetown, Ky., is in prospect, according to a proposition credited to Samuel L. Allen, superintendent of the Georgetown Lighting Company, who was recently elected president of the Georgetown Commercial Club. The proposal is that Mr. Allen will supply the current and maintain the sign if someone else will provide it and erect it.

INSPECTING GOODS AFTER THEY ARE RECEIVED; THE BUYER'S RIGHTS AND LIABILITIES.

By Elton J. Buckley.

Some more law on the buying of goods is brought forward by the following letter:

Rochester, N. Y.

Elton J. Buckley, Esq.

Dear Sir: We are having a fight with a New York house over whether we have to pay for some goods which they shipped to us and which we found to be not according to specifications. Perhaps you can get something out of it for your column, and at the same time give us some light.

We ordered certain goods through one of this firm's salesmen. It was a line we had been handling, which a year or so ago had first been bought from samples. All the shipments had been up to standard except the last. When the goods arrived we supposed they were up to sample as usual, and did not examine them at once. About ten days elapsed between the time the goods were received and the time we examined them, preparatory to delivery to our customers. We then found them below standard and wrote the shipper, telling him we would not accept them and would ship them back. This we did, but they refused to receive them and the railroad company is now threatening to sell them for the freight. Who is right? The New York concern say the goods are all right and in accordance with the contract, and that we accepted them.

Yours respectfully,

M——— Bros.

This is a familiar situation in everyday business and is governed by simple and familiar law. Let me say at the outset that if the goods really are up to standard, this correspondent will have to pay for them of course. They are justified in rejecting them only if they are not up to standard, and not even then if they have been too slow in inspecting and rejecting.

It is a fundamental rule, almost never departed from, that the buyer of goods has a right to inspect them within a reasonable time after he receives them, and that pending that inspection, he cannot be held as having accepted them. These points, however, are of paramount importance:

1.—He must inspect within a time that is reasonable under all the circumstances of the case.

2.—If he rejects he must at once notify the shipper.

3.—If he either fails to inspect within a reasonable time or fails to notify the shipper promptly, he will be held as having accepted the goods and must pay for them.

(Copyright, 1915, by Elton J. Buckley.)

I take the following from a leading case which states the law as it exists all over the United States:

The seller is under obligation to afford the buyer opportunity for examination of the goods, so that he may satisfy himself that they are in accordance with the contract. The buyer has the right of inspection and a tender under circumstances not permitting of an inspection is not sufficient to constitute or excuse delivery or to put the buyer in default. But a refusal to inspect where a reasonable opportunity has been afforded constitutes a breach of contract upon the part of the purchaser. Only a reasonable time is allowed for inspection. The place of inspection is the place of delivery. Taking such possession of the goods as is necessary to make an inspection does not constitute acceptance of them. The buyer must notify the seller of the result of inspection.

Many of the cases turn on what is a reasonable time for inspection. There is no rule about this—it depends on the peculiar facts of each case. I recall one case in which a firm bought goods that were to be delivered by boat. They made no effort to inspect when the boat arrived, but allowed the stuff to be landed and delivered to them. Then they inspected, found that the specifications had not been complied with, and rejected. The court said they were too late with their inspection and rejection. Apparently they could have inspected before the boat unloaded, and when they let it go until everything was unloaded and actually carted into their place, they did not inspect within a reasonable time.

There are also several cases in which goods were shipped via a railroad and where inspection, under the rules of the railroad, could not be made in the freight yard or anywhere on the railroad's premises. In these cases the consignees took the goods to their own stores, which under the circumstances were the only places available, and inspected them there. The point was the same—was inspection done within a reasonable time, or was it waived by taking the goods into the store? The courts have always held that inspection being impracticable anywhere else, the consignee did not accept the goods merely by taking them into his store. He could reject after inspection.

It should be remembered that inspection and rejection are not of any avail whatever without notification to the shipper, which must be just as prompt—in fact, even more so, if anything—as the inspection.

It is a good rule to get around to inspecting goods received just as soon as possible after they are received.

THE OUTLOOK IN OTHER INDUSTRIES

The Prosperity of the Electrical Industry is tied up in the Prosperity of the Other Industries. So Extensive are the Ramifications of Electrical Service, that we Find it a Part of Productive Effort in Every Occupation. Incidentally the Use of Energy for Household Utilities Gains or Fails as the Employment of Men and Women in Other Industries is on the Increase or on the Wane. The Opinion of the Editors of the Leading Trade Publications of the Country, Published below, are Full of Human Interest, Point to Many Sales Prospects and Reflect Accurately the Outlook for Business in the Country at Large.

Agricultural.

"The agricultural implement business received a set back in 1914 on account of the war, for our manufacturers had a substantial export business that was stopped in a great measure, but they immediately laid plans for an increased domestic sale, and the result of their labors is shown by the crop reports.

"The industry today is prosperous and the factories are all working good time.

"Gasoline and kindred fuels are playing an important part in the operation of farm machinery, and, of course, **to a limited extent electricity and electric appliances are used, and this feature of agricultural implement development is well worth the serious attention that it is receiving from your manufacturers,** for to my mind the operation of implements in the future must be through more perfect development of electric power."—Grant Wright, Editor *The Eastern Dealer in Implements and Vehicles,* Philadelphia, Pa.

"In the farm power field, the prospects were never better than they are at the present time. This is especially true of farm tractors. There is extraordinary interest in this subject manifested by the farmers in all parts of the country. A few years ago the tractor industry flourished for a brief period and then died down. About a year ago the small tractor began to attract attention and now the farmers everywhere are talking of buying. It looks as though the trade this fall and next spring would be record breaking. We are practically certain of two or three years of intense activity and after that of a steady persistent growth for several years more. The threshing machine industry will probably go along in about the usual way, but with a diminution in the number of steam traction engines built.

"In the electric line the **farm trade is concerned principally with house lighting.** This requires a two or three-horsepower gasoline engine and from a one to two-kilowatt generator. **The trade in these small plants is increasing from year to year and will continue to increase.** The general use of electrical power in agriculture is as yet a long look ahead into the future. It may come some day, but that day will undoubtedly be quite far distant."—P. T. Rose, Assistant Editor *The American Thresherman and Farm Power,* Madison, Wis.

Automobile.

"The automobile and motor truck industry is profiting very much because of the war situation and factories are busier now, and have been for months, than they were a year ago. Business has increased all along, and the great difficulty is for automobile and truck makers to secure enough parts for their machines. In many factories deliveres are being held up because of this lack of parts. The demand for motor trucks is such that few, if any, of the factories can meet the requirements. The war has called for large numbers, but there has been quite a general increase in domestic demand during the past few months.

"Farmers are buying light capacity vehicles which are apparently taking the place of many horses sold to belligerents.

"Retail sales of automobiles throughout the country are much in advance of a year ago, in spite of the fact that the harvest is holding up sales temporarily in many of the agricultural districts, and weather conditions have been somewhat against farmers taking cars off the dealers' hands during the past two or three months.

"Motor car distributors in the large centers are not able to get enough cars to meet the demand and is a condition not heretofore known at this season of the year. Only increased business is looked for in the future in both the passenger car and truck field."—David Beecroft, Directing Editor *The Automobile,* New York, N. Y.

"The only way my special attention is directed toward electrical illumination involves the motor car. I know that the production and sale of automobiles is growing daily and that, commensurately, the demand for electrical illumination is increasing. **This should be the greatest season for motor car electrical illumination since the automobile was introduced.**"—G. T. Bindbeutel, Editor *Motor Print,* New York, N. Y.

"General business conditions in the trade territory which is usually allotted by other markets to St. Louis are very bright at this time. We have had excellent crops which fact has put new spirit into the farmers and made them ready to spend their money. This in turn has been communicated to the retail merchants in their nearby towns and by them in turn to the wholesalers and manufacturers of St. Louis. The writer looks for a year for very brisk business from September 1, 1915, to September 1, 1916.

"There has been a notable improvement in St. Louis in the sale of electric automobiles. We have an active lot of agents and branch managers here who are using general publicity to educate the public to the value of the electric automobile for city and nearby use and they are succeeding. **We look for an increase of 100 per cent in the sale of electric cars during the coming year.** As far as I can ascertain the general electric business in this territory is also very good. I know this is true as regards electric supplies for automobiles. —Robert E. Lee, Editor *Auto Review,* St. Louis, Mo.

Bakeries.

"This ancient industry has had a phenomenal development in the last 10 years. While our population increased 21 per cent the number of bakeries increased 61 per cent; the value of bakery products, 127 per cent, and the capital invested in the business 160 per cent. Because it deals mainly with a necessity—the chief manufactured food of mankind, the business is not subject to the fluctuations common to many others. There appears now no reason why the baking industry should not prosper in the near future. True, the price of flour (the baker's chief raw material) is uncertain, and the outlook is for hand-to-mouth buying; but there is no sign of a lessened demand for bread. While bakers with meager capital are slower than usual to spend money for improvements, the larger plants do not hesitate; they keep on preparing for big things in the future. The demonstrated efficiency of mechanical bread making is steadily compelling the installation of machinery in bakeries that a few years ago did not dream of such a thing; and an increasing number of these machines is run by individual motors. **Electricity shifts and blends the flour, mixes, divides, weighs, and molds the dough and wraps the baked bread in the bakery, and the baker's motor delivery**

wagon grows more common each day upon our streets. These conditions, and the fact that most of our bread is made at night, should combine to make the baker and the electrician fast friends."—H. R. Clissold, Editor, *Bakers' Helper,* Chicago, Ill.

Brick and Clay Working.

"The conditions which confront that part of the clay products industry which has to do with the manufacture of materials that enter into building construction, is far from being satisfactory. Three bad years have passed, each leaving its scar on the industry and although the promised prosperity of 1915 seems imminent, it will bring but little comfort, since it will come when the frost prevents any great building impetus.

"The industry believes in electric power and improved plants are seldom built without the installation of a motor. Later, when building operations have resumed, material been shipped and money collected, the demand for electrical apparatus in clayworking plants will be very large.

"The present financial condition of nine-tenths of the men engaged in manufacturing brick, hollow tile, terra cotta, etc., is such that they will not be able to spend any money on their equipment until the stock which is now in the plants has been shipped and used and paid for.

"From present appearances, this will not occur until well into the spring of 1916."—Frederic W. Donahoe, Editor, *Brick and Clay Record,* Chicago, Ill.

Brooms and Brushes.

"There is every indication of renewed business activities in the broom and brush industries, and its subsidiary line, the manufacture of handles. While the demand for brooms during the summer months did not assume any definite improvement, prospects at this time are generally regarded optimistically and the fact that distributting houses have been purchasing sparingly and in accordance with actual consuming requirements for several months past, justifies the expectations, that their stocks as a rule, are low, and that the first indications of a revival of consuming buying will reflect quickly to the manufacturers' advantage.

"Reports of light business have prevailed in the brush market, but dealers were reconciled to this position as wholly typical to the season and are not discouraged as to fall and winter prospects. There have been no new developments concerning prices, and the generally firm position of the basic material operates with sustaining effect upon the market for brushes. A good demand for exports is reported for English account comprising round quantities of shoe, hair, and cloth brushes. England it is believed is operating for the allies generally. The prices of brushes have been raised in England and France, but the increase in America has been extrordinarily slight considering the advanced prices for bristles. Increased business should be general during the fall and winter months.

"A fair volume of business is received in the broom-handle trade. Supplies are adequate for the usual requirements and all broom and mop handle plants are being kept busy.

"There has been a tendency on the part of broom, brush and handle manufacturers to adopt labor and time-saving electrical apparatus, and in this respect it is safe to say that there has been a gain of fully 25 per cent in electric power equipped plants in this country in the past ten months."—J. S. Smith, Editor, *Brooms, Brushes* and *Handles,* Milwaukee, Wis.

Buildings and Building Material.

"Our various representatives throughout the country advise us that business is looking up and that there is every prospect of a good amount of work for the fall.

"Architects are generally very busy and in the Chicago district especially, a large number of projects are going ahead, which were held up by the recent strike.

"As practically all of these buildings require electrical apparatus and supplies of some sort, it seems to us that the prospects should be good for increased sales in these lines."—Charles A. Miller, Jr., Managing Editor, *The National Builder,* Chicago, Ill.

"The exceptionally bright crop reports from the United States Government authorities have given encouragement to the manufacturers and dealers of building materials throughout the country. As a result of the European affray and the tendency in the past year on the part of American financiers to withhold their money from new building ventures the building material industry has naturally been thrown into a pessimistic channel. In addition to this, building reports for the past year have shown decreases when compared with similar periods of the previous year.

"In 100 leading cities of the country for the month of July there is shown a loss in the value of building permits issued amounting to 12 per cent, but close scrutiny of the figures furnished by building commissioners show that such cities as Brooklyn, Buffalo, Minneapolis, Washington, D. C., Kansas City, Cincinnati, Atlanta, Omaha, New Orleans, Sacramento, Lincoln, Portland, Me., Des Moines, and Topeka, show gains in the number of permits issued in July, 1915, when compared with July, 1914, ranging up to 150 per cent.

"In a number of cities like Chicago, strikes among the building trades tied up work for several months and the activities shown in such centers at present are largely due to the enforced idleness earlier in the year.

"Throughout the country, however, optimism prevails in this particular field in spite of building reports, and late statistics from a few centers indicate that business during the fall months warrants this attitude.

"With the harvesting of crops there will naturally result a large amount of construction work in the rural communities. During the next 12 months there will be an increased amount of road work calling for sand, gravel, crushed stone, cement, vitrified brick and other road materials.

"One of the interesting features of building permits issued in the larger centers is that the type of construction is superior to that demanded on the part of builders heretofore. With better materials and more costly construction, naturally a much improved interior will be considered and buildings will be equipped with electric lights and electric accessories which make for the comfort and convenience of homes, offices and industrial plants." —George A. Olsen, Retail Editor *Rock Products and Building Materials,* Chicago, Ill.

Coal Mining.

"The coal business as a whole is extremely dull. Mining companies are only purchasing such supplies as are absolutely necessary to the operation of their plants. There are great opportunities for the sale of American coal in South America and in Europe, due to war conditions. However, mine owners in America have not yet gone after this business in a serious way. The very small increase in the export of coal from the United States is due largely to a lack of bottoms.

"The coke business has improved slightly during the past few weeks, due to the increased activity in the steel business.

"Anthracite mining is quite dull at the present time, but is likely to improve considerably in the fall and winter when the mining companies will be storing coal in expectation of a possible strike in the spring when agreements with the miners are to be renewed."—Floyd W. Parsons, Editor *Coal Age,* New York, N. Y.

Concrete and Cement Products.

"The greatest single tendency in the development of manufacturing methods in the cement industry is the electrification of Portland cement mills. There is an unmistakable trend in the direction of exclusive use of electric power for driving the very heavy equipment necessary for the manufacture of cement. Power represents about 25 per cent of the cost of cement production. **If the production of a barrel of cement represents a power consumption of 18 kilowatt-hours, on a basis of ninety million barrels annual production this represents a possible power consumption of over a billion and a half kilowatt-hours.** These figures are given to show the possible field for electrical apparatus, and, as stated before, there is a growing sentiment among cement manufacturers in favor of the exclusive use of electric power applied through individual units direct-connected.

"The other development is in the contracting field where the use of small electric power units direct-connected to such equipment as concrete mixers, portable saw rigs, pumps, etc., is constantly on the increase. The electric motor as a power unit is often preferred over steam because it does not require a licensed engineer to run it: it is often preferred over gasoline power because of its reliability and the ease with which it is started. The national movement for the suppression of unnecessary street noises seems to help the electric motor on construction equipment used on public streets.

"These are two different lines which seem to promise bigger business for manufacturers of electrical supplies who turn their attention to the cement manufacturing field and the contracting business."—R. Marshall, Business Manager *Concrete-Cement Age,* Detroit, Mich.

Drugs and Druggists.

"There are approximately 50,000 retail druggists in the United States. Their stores are kept open from 10 to 24 hours a day. We do not think the statement will be disputed that druggists burn more electricity than any other class of retail merchants. We believe that the better class of retail druggists are very much alive to the value of electricity in advertising their business. The wide-awake ones use electric signs, electric window illumination, brilliant store illumination, electric cash carriers, electric mixers at the soda fountain and not infrequently they are purchasers of electric motors for operation of ice-cream-making plants which are used in conjunction with their soda fountains.

"We think these facts are conclusive as pointing to the importance of retail drug stores as consumers of electric power. Now as to business conditions at present and the outlook for fall and winter. We believe that there is on the way a gradual return to normal. We feel that before winter has set in this country will have begun to feel the effects of a marked upward trend in business. Any improvement will, of course, be beneficial to the drug business.

"The war has affected the drug trade more seriously perhaps than any other line of retail business. Many of the drugs and chemicals and pharmaceutical preparations are imported from Germany and other European countries. The war has either shut off our imports entirely on some things, or has reduced them to such an extent that prices have been materially affected. On some items the increased cost has ranged from 100 to 1,000 per cent or more.

"Druggists have had to pay more for their stocks and it is doubtful if they have been able to charge much more to their consumers. Consequently their profits have been reduced.

"On the other hand, the business of the druggist is in some respects one of the most stable, the demand for drugs, medicine and sundries being a consistent one the year around. As a general proposition we believe that retail druggists the country over are in as prosperous a condition as any other retail merchants."—The Editors, D. O. Haynes & Company, Publishers *The Pharmaceutical Era and The Soda Fountain*, New York, N. Y.

Dry Goods.

"On account of our operating the Store Equipment Magazine Section that appears once each month, both in the *Dry Goods Reporter* of Chicago, and the *Drygoodsman of St. Louis*, we are in a position to feel the pulse of progress in the retail field in the way of store building and remodeling, and it is significant that the last two months has brought to us more inquiries from our readers regarding store equipment than in any other two months in the ten years we have been publishing our section.

"On account of the introduction of the gas-filled Mazda lamps, there is a widespread movement among retailers for using this method of lighting in the store, and this calls for a new type of fixture.

"A great amount of remodeling, principally due to the installing of the new type store fronts, calls for a large increase in show-window lighting.

"It is the general belief that if the weather is favorable the retailers will have a most prosperous season this fall and winter."—George J. Cowan, Secretary, *Dry Goods Reporter*, Chicago, Ill.

Electric Railways.

The record of 950.2 miles of track built or put in operation during 1912; 1,018.9 miles in 1913 and 946.38 miles in 1914, and of 6,001 cars purchased in 1912; 5,514 cars in 1913 and 3,010 cars in 1914 tends on close analysis of the details involved to confirm the general impression that the electric railway industry is not keeping so much abreast of the growth of the country as it did in preceding years. Without a doubt electric railways have felt the depressing influence of the nation-wide curtailment of business that has been evidenced with increasing force since the middle of 1913. Yet indications are not lacking that this condition will be mitigated in the future. We cannot here make a composite analysis of all the factors involved in the present electric railway business situation, but a few points are worthy of note. Electric-railway earnings for 1913 and 1914 as compared with steam-railroad earnings, building permits, bank clearings, steel and iron production, agricultural products and the cotton crop, show the highest relative stability, and it is to be expected that under normal circumstances they would respond most quickly to the business rejuvenation that is now presaged by the increasingly favorable foreign trade balance, the lack of a marked tendency toward prohibitive prices for capital and the exceedingly propitious crop reports. The full response of electric railway earnings to these influences, however, is likely to be retarded by some of the factors peculiar to this industry, such as the special problems of rates, wages, regulation and now jitney competition. While these factors have a certain effect upon the relative stability of electric railway earnings, they influence more the relative profitableness of the industry and are the more dangerous thereby. In spite of the stability of earnings, the problem of furnishing continually more and better service under constantly increasing costs at a depreciated rate of fare has in recent years become one of serious moment, but we believe that daily there is now growing a wider appreciation of the economic service performed by electric railways, their right to protection against unfair unregulated competition of jitneys and their needs for successful operation. Various decisions, such as those in the Schenectady Railway, Manchester Street Railway, Middlesex & Boston Railway, Blue Hill Street Railway, and Eastern and Western rate cases, indicate that at last the courts, the commissions and even the public seem to be taking a more rational view of the urgency of relief to common carriers. This promise of improvement in regard to the special problems of electric railways, when considered in connection with the present propitiousness of general conditions, warrants a letting-up of pessimism and even a mild optimism in the electric railway field. The prospect should encourage purchases, for in the shadow of the receding depression prices should be low, construction work cheap and long-time loans fairly moderate-priced. — *Electric Railway Journal.*

Engineering Construction.

"The outlook for the future depends chiefly upon the condition of the financial markets. If it should prove possible to obtain capital upon easy terms, and if the earnings of the railway companies can be maintained at a point which will restore confidence in railway investments, it is likely that a very large amount of work on improvements of railway lines, which have been postponed from year to year for the past half dozen years, will be undertaken." — Charles Whiting Baker, Editor-in-Chief, *Engineering News*, New York, N. Y.

"Our experience indicates that during the depression of the past two years municipalities have materially curtailed their expenditures for new work. This curtailment has been evident from the fact that the total amount of money expended for new work has been approximately the same for the past three years, or about $1,240,000,000 annually. This includes, of course, all sorts of public work of which electrical work is only one item.

"This summer there has been a marked improvement and our daily record indicates that more new work is being done now than at any similar period of the year for the past 20 years covering which we have record. Municipal bonds are meeting with a fair demand. In fact, some of our clients among the bond brokers state that municipal bonds are about the only thing among which they are able to do business at this time, except, of course, that the demand for listed bonds is active.

"To answer your question more definitely, **there is every indication in our field that the demand for electrical supplies and apparatus will be abnormally large during the coming year.**"—C. S. Sale, General Manager, *Engineering Publishing Company*, Chicago, Ill.

Engineering Equipment.

"Our field so closely ties with your own, that I doubt if I can give you anything of value in regard to the power-plant field which you have not already in hand.

"I have not much faith in anybody's opinion in regard to the business outlook. The facts as they develop are the only things of importance.

"Increase in the activity of the steel mills, both in resuming work of existing plants and building new ones, seems to indicate a live demand in that field for electrical power equipment.

"As you know, on account of high interest rates now prevailing, in spite of the large amounts of money in the banks, the development of central-station properties for lighting, power or railway service, has been slow, and the outlook is that it will continue that way.

"Industrial plants, in the matter of electrical equipment as well as machinery, vary greatly, depending on the nature of the industry. All of those plants which are concerned in the furnishing of war materials are likely to demand refitting and increasing of electrical equipment. Industries engaged in supply of articles for peace

consumption are running at normal capacity or under, and are not likely to refit more than is absolutely necessary or to enlarge.

"There is tendency more and more to the use of electrical drive in all plants, and electric lighting in all buildings, both commercial and domestic, so that the business of supplying equipment for electrical installations, and motors for industrial plants, is almost sure to increase slowly and steadily as it has been doing at all times."—Arthur L. Rice, Managing Editor, *Practical Engineer*, Chicago, Ill.

Flour Milling.

"The flour milling industry of the United States was never more prosperous than it is at the present time. The crop year ending June 30, was a profitable one and flour exports for the fiscal year were the largest on record with a single exception. There was natural profit in flour trade, due to the enhanced value of wheat supplies immediately after the war. Trade was stimulated and quite profitable, but many risks were assumed. Following such a profitable year it is natural that improvements, enlargements and possibly new mills will be built. In fact, during May and June the equipment of mills was quite general.

"At the present time flour trade is dull and the mills are getting a streak of lean, but there is every reason to believe that the amount of new electrical equipment among mills will be in harmony with general improvement brought on by a year of unusual prosperity. In some machinery lines supplying flour mills, the volume of business is said to be almost double what it was last year."—C. M. Yager, Editor, *Modern Miller*, Chicago, Ill.

Furniture Trade.

"Little change in the general commercial situation throughout the furniture trade field, in which for the past eighteen months influences of subnormal trend have been manifested, could have been noted in any analyzation of the situation immediately following the close of the midsummer exposition. Trade has been depressed for some time. The markets, particularly in the leading centers of New York, Chicago, and Grand Rapids, were lethargic at their opening. As the buying season progressed, attendance records equalled or nearly equalled those of the year before, but little improvement in the buying attitude of the retailer was indicated.

"Many manufacturers left the exhibition centers on July 21, the practical close of the market—satisfied with the results of the exposition, not because they had made record sales, but because their somewhat modest expectations had been realized. Buying throughout the markets was spasmodic and the tendency was to purchase only patterns of recent development in order that a semblance of freshness might be contributed to the fall stock of the retailer. Some orders of more than usual volume, particularly in the chamber furniture field, were accorded unusual discounts which offset the natural upward trend of their influence.

"With a retrospective period of 60 days a new tone may be interpreted throughout the field without undue optimism. Undoubtedly considerable advance has been made within the past 30 days, particularly is this true in the South where factories for months closed have been reopened and plants running for several seasons at half blast are again operating at full capacity. The improvement, of course, reflects a corresponding activity in the retail field. The dealer is again buying; not in quantity, but in such amounts as will bring the retail stocks throughout the country, which for some time have been low, again to normal assortment. Whatever improvement has thus far been noted, undoubtedly will be augmented soon after the opening of the fall season. The tendency without question is constructive.

"There has been noted in various parts of the country a revival in building conditions. Many new homes naturally necessitating home equipment have encouraged the retailers of communities both north and south to greater effort. The pre-fall period has been especially active in this direction. The tendency is reflected in the constantly increasing average of home owners in many localities.

"Little can be said of the spring and summer of 1916 that is not largely supposition. Indications are favorable. There is a more optimistic attitude on the part of the trade in both retail and producing departments. Some of the problems attendant upon the war involving especially domestic manufacture of analine dyes and the producing of domestic stains which will compete with those formerly produced from imported chemicals will to some extent have been solved. A sounder footing undoubtedly will increase the confidence of the trade. Larger exports are expected to South America and to the Orient and districts unaffected by the European conflict. This avenue of output is improving in aspect constantly. Beyond all reasonable doubt the status of fall and winter trade—particularly that of the holiday buying season—will do much to determine the situation through following seasons. There is cause, however, for optimism. The trade faces the possibility of an active future."—E. M. Wakefield, Associate Editor, *The Grand Rapids Furniture Record*, Grand Rapids, Mich.

Grain Dealers.

"Continued rainfall has made it impossible to gather the small grain in most sections, with the result that much wheat, oats and barley which has been cut, has sprouted in the shock. Two weeks of dry weather would mean millions to the country, and release a flood of wheat upon the central markets that would make everything hum.

"The enormous crop promised for the winter wheat section was materially reduced by wet weather, and the same cause now promises to reduce the yield in the spring wheat states, which will produce, even after liberal reductions for damage, the largest crop in their history.

"The grain-elevator men handled an enormous crop last year and expecting even a larger crop this year, they have been building rapidly, improving facilities in all parts of the grain surplus states. We find that many grain-elevator men are getting current from interurban lines and from local power plants, for illuminating their plants, as well as for propelling their machinery, so that **electricity is being used more extensively each season than before by the wholesale grain dealers of the country.**"—Charles S. Clark, Manager, *Grain Dealers Journal*, Chicago.

Grocery—Wholesale and Retail.

"Conditions in the grocery trade are looking up, business is improving with each month and as the wave of prosperity due to increased manufacturing sweeps over the country, the food products trades will be the first to reap the reward.

"In nearly all lines there is an increased demand and this of course means better conditions internally in the trade.

"With this improvement will come new buildings, new fixtures and a general burnishing up of many business houses that have held this work in abeyance, due to the general conditions.

"With this will come a demand for electrical goods and fixtures, as the progressive grocer realizes that a well lighted store, with proper lighting of his windows, is the best asset in an advertising way that he can possess. It is, in fact, a method of advertising we have always urged on our readers and continue to do so."—S. W. Roth, Editor, *The Roth Publications*, Chicago.

"The grocery business has been comparatively quiet for the past two years or more. There has been a considerable falling off in the sale of groceries generally, but more especially in the sale of luxuries. In some of the agricultural states business has been rather better than in the manufacturing communities, which means to a large extent the eastern states. There has been a good deal better feeling during the past few weeks and it is our opinion that this fall will witness a great improvement in the food business generally. Prices in the food line have averaged to be very low for some time past, and while we hear a good deal said about the high cost of living, and perhaps always will, the fact remains that for the past year or so, with the exception of meats, prices of foods have been lower on an average than for many years past, in fact, actually lower than they were in the seventies when carpenters were glad to work for $2 per day.

"The manufacture of war supplies has given employment to thousands of men in the east, and the effect of it is already noticeable. We expect business in the grocery line to gradually increase and before many months to become very active. Some few articles, including evaporated milk, are being sold below the cost of production, which condition we hope will soon be remedied by the increased demand sure to follow the recent quiet period. The depression has taught those in the trade to make a closer study of their business, including the matter of costs and, in short, has served to teach those engaged in it to be better merchants.

"Referring to the matter of electrical apparatus **the general tendency of grocers to install modern electric systems for lighting is very marked, and the store not well lighted will soon be**

an exception to the rule."—Edwin B. Pillsbury. Editor *Grocers' Magazine*, Boston, Mass.

"As is perfectly obvious, the consumption of food is one of the last things to be affected in time of business depression. This would apply especially to staple items, however, of course a business depression of any kind has a tendency to make the grocer's collections slower and his own merchandise supply purchases of a hand-to-mouth order.

"The above has been the case during the last couple of months in the grocery business.

"Crop conditions, according to the latest Government reports, are certainly very promising and if these bumper crops materialize, they will in a large measure, help to bring business conditions back to normal.

"It is the city dealer—the merchant who is obliged to depend on the trade of workers in the industrial plants—rather than the country town merchant, that has been complaining.

"In other words, the rural districts for the most part are in good condition and have been throughout this year.

"One of the first things the retail grocer does in times of financial depression is to cease buying new equipment. This would mean that instead of buying a new power coffee mill or an electrically operated cooling plant, he would await the return of confidence and prosperity.—Harry W. Otto, Editor *The Modern Grocer*, Chicago.

"The present conditions of the grocery business, which is one of the greatest departments of mercantile activity, inasmuch as it has to do with the disposition of the daily food of the people, the general volume of merchandise moving from manufacturers and producers through the different branches of the grocery trade to consumers is about normal. It cannot be otherwise, because people must eat and economy as to food, if practiced at all, is spasmodic, and where consumers curtail in one direction they offset the economy in another.

"The jobbing grocery houses report just at the present time a steady but not active business. The rainy weather which continued through the month of July very greatly interfered with the summer-resort trade and the demand from that source has been very much less than usual to date. If the month of August proves seasonable for summer-resort business, undoubtedly the deficit of July, so far as movement of goods is concerned, will be considerably reduced.

"A feature of the business which should be particularly mentioned is that collections are extremely slow, very difficult; money is being hard to collect. This is a complaint which comes from both branches of the business—wholesale and retail.

"I believe that by the last of October we shall experience a marked improvement. I look for a little stronger prices on food staples but do not expect any radical advance. The restrictions upon exportations prevent the European demand from making great inroads upon our productions, so that prices are not likely to be greatly enhanced because of the requirements for war purposes.

"I look upon the future as decidedly hopeful, not only hopeful but bright. The country is prosperous; industries are active; the only thing being a certain uncertainty, not of a serious nature, but sufficient to keep people a little conservative. However, confidence is gradually returning and with a great, wealthy, prosperous country there is no reason why the future should bring forth anything but prosperity. I expect to see 1916 open very auspiciously for all lines of business.—*C. W. Willis*, Editor *New England Grocer and Tradesman*, Boston, Mass.

"There is a gradual awakening on the part of retail grocers, particularly as to the necessity of better lighting.

"One need only go down the streets of the business section of any city and observe the prosperous retailers to ascertain that well lighted stores are playing an important part in every day business and are, in fact, a necessity to the successful conduct of any grocery store. This situation is emphasized if one views a dimly lighted store, and almost invariably such a business is not enjoying the trade as does the store that is brilliantly lighted.

"Our observation also shows that better window lighting is being indulged in by the progressive retailers as they are realizing the importance of a good light in drawing attention to good displays and thereby attracting trade. A clearly lighted store goes hand in hand with the sale of groceries as nothing appeals more to the consuming public than something which has the appearance of brightness, cheerfulness and cleanliness.

"As a further indication of changed conditions in this respect, let me point to the fact that the Iowa State University, in its Trade Extension Division, which department specializes in retail merchandising, is featuring store lighting in one of its lectures, backed up by stereopticon views showing poorly and well lighted stores and windows.

"Nothing appeals stronger to one interested in merchandising than this portrayal in pictures of the good and bad effects of lighting.

"Most all cities now, of course, have electrical facilities, and the progressive merchant is forced to adopt every means, in a competitive way, to draw trade and light is an important factor.

As to the grocery business generally, conditions are still below normal, but the future outlook seems to be more hopeful. One would think the people have to eat regardless of conditions and that the grocer would be the last to suffer loss of trade. This is not true, however, and while people are forced to eat to sustain life, yet when there is a financial pinch they are compelled to economize in their purchases, and instead of having a variety of food for each meal, the menu is reduced and in addition the people buy a little lower grade than has been their custom when times were prosperous."—George J. Schulte, General Manager *The Interstate Grocer*, St. Louis, Mo.

Harness and Saddlery.

"There was a time when the iron and steel industry was a reliable barometer of business, but with their apparent prosperity there seems to be a depression in many other industries, including harness and saddlery.

"However, taking everything into consideration, business men feel safe in predicting that the autumn trade, while not phenomenal, will be substantial and conspicuous by an unusually large proportion of cash business. Already harness factories and saddle houses are reporting good collections. Traveling salesmen from many states are exceedingly optimistic concerning autumn trade.

"There is a growing demand for modern machinery in every branch of the harness and saddle industry, and, indeed, the smallest manufacturer has installed, or will probably make use of electrical apparatus wherever possible."—E. M. Mantiply, *Harness Herald*, St. Louis, Mo.

Hide and Leather.

"European war demands have doubled the exports from the United States, of leather, and manufactures of, for the fiscal year ended June 30, as compared with previous fiscal period in 1914.

"While war demands were active for our leathers, shoes, harness, etc., the domestic demand has continued to be severely curtailed, indicating widespread economy among the people at large.

"War orders are in abeyance at present, but domestic inquiries for leather and goods made therefrom is showing some improvement. Very high prices for hides and skins have discouraged tanners from working their plants to full capacity.

"Manufacturers of leather, shoes, harness, belting and other leather merchandise are more and more recognizing the great advantages and economies of electricity for light and power in factories.

"This field of manufacturers is pretty closely covered by *Hide and Leather*, and we are satisfied that widespread popularity of electricity among our readers is bound to increase.

"We believe that electricity has a great future among shoe and leather factories. Steam has outlived its usefulness for power, and just as soon as shoe and leather manufacturers are more confident about the return of business activity, there should be many openings for the installation of electrical equipment."—R. C. Jacobsen, Editor *Hide and Leather*, Chicago.

Hotels.

"Hotel business is a sort of business barometer, as travel reflects largely the business condition in **all** lines of industry, and the amount of travel is the measure of hotel prosperity.

"During the more than 35 years that I have published *The Hotel World I* have never before seen both hotel and general business so what I may describe as 'spotted,' some doing well and others poorly, but a quite unanimous hesitancy to embark in new enterprises.

"Causes of the 'spotted' condition, to my mind, is due to the European war, the tremendous demand for munitions, for grains, horses and mules, in some sections having more than counterbalanced the depression previously inaugurated by the change of national administration and adoption of a policy to lower prices of all standard commodities to the public through tariff reductions. The logic is simple and easily understood. Every dollar's worth of property is owned by **somebody**; reduce the value of the dollar's worth to ninety cents and you inaugurate 'hard times,' universal economy and retrenchment. Roger Babson, our greatest statistician,

has said: 'The difference of one necktie for every man in the United States during a year will create a financial depression.'

"As to the hotel outlook. The 'See America First' movement and the European war effect on American tourists have not overbalanced the apathy to pleasure travel caused by the psychology of gloom due to a great international militant catastrophe and a general business depression. New hotel construction has consisted largely of filling contracts entered into previous to the war, and many new hotel projects are held in abeyance. Naturally, there is large travel California- and Exposition-ward, but not one-half what was expected.

"One of the prime worries of the hotel men at present is the widespread prohibition movement, as nearly all hotel operators are lessees and not hotel owners, and their rental leases are based on revenues that include liquid supplies profits. They can stand the losses on alcoholic sales, but not the loss of patronage occasioned by killing an industry involving hundreds of millions of capital and the labor of millions of men, for it is the small margin of business above gross operating receipts and disbursements that measures the profits and the prosperity.

"The use of electricity in hotels, I feel sure, will more than double in the next five years, as the hotel men are slowly but surely learning the efficiency and economic advantages of electricity in the culinary department; but the hardest thing in the world to get out of is a rut, a habit or encrusted routine, and the electrical manufacturers are largely to blame, so far as the hotel field is concerned, because they have not done the proper educational work with hotel men through channels that reach the attention and understanding of the hotel fraternity. The modern hotel, both in country and city, is one of the largest and most promising fields in the world for electrical development, as was evidenced by the Electrical Number of *The Hotel World* of November 7, 1914."—Henry J. Bohn, *The Hotel World*, Chicago.

"The electrical energy is used in every department—engine room, laundry, kitchen, dining room, office, bed rooms—it dominates in the telephone and signals communication; in illumination, in power (elevators, ventilation, cleaners), also has practically become indispensable in a thousand and one labor-saving devices."—John Willy, *The Hotel Monthly*, Chicago.

"The past year has not been the best in its history for the hotel industry. Various untoward developments which affected business in general had a quick effect on hotels, which, of course, depened for their prosperity on that of business houses in general, and particularly on that of the big wholesale and manufacturing concerns which travel salesmen.

"Despite all of this, however, the past 12 months have been much better than members of the hotel industry expected in many instances. The European war, which perhaps was the most potent of the influences at work, reacted favorably, as far as the hotel industry is concerned. Tourists who formerly made a point of seeing Europe every year have perforce contented themselves with the attractions on this side of the water. This, and other advantageous factors, have made the year better than fairly good. The hotel industry is prosperous, generally speaking, and is one of the few which is not seriously retrenching.

"Improvements are numerous in the hotel field, while the number of new houses which will go up in 1915-16 has in no way been diminished. The Blackhawk, at Davenport, Ia.; the Muehlebach, at Kansas City; the Kaiserhof, at Chicago; the Statler, at Detroit; the New Morrison, of Chicago, and the Inman, at Champaign, Ill., are but a few of the hotels which opened their doors to the public during the last six months. An even larger number will be erected during the next year.

"From the standpoint of the electrical industry, the subject of hotels is a peculiarly interesting one, because of the fact that no other line of business offers such a profitable field to manufacturers of electrical devices of all kinds. In the first place, the tendency among modern hotel men is to install their own power plants, instead of buying current. While the smaller houses are in some cases buying power, the larger hostelries, and in nearly every case, the new ones, are installing private plants.

"Hotels long ago recognized the potency of publicity, and are generous consumers of current for electric signs. Many instances of this may be seen in Chicago alone. The Hotel La Salle, the Sherman, the Brevoort, and many others in and out of the loop may be located blocks away by the brilliance and number of the electric signs which beckon to potential and actual guests.

"*The Hotel Bulletin*, no later than last month, in an article on the operation of kitchens, called the attention of the hotel trade to the possibilities of electricity for use in kitchen ranges and broilers, as well as for making coffee, toast and other similar dishes. Coal and gas have heretofore been the accepted fuel. *The Hotel Bulletin*, however, pointed out the advantages of electricity, and urged hotel men to secure further data before making installations in new or old houses.

"The possibilities for the use of electric current and electric appliances in other departments of hotels seem unlimited, though it appears that the electrical industry has neglected its opportunities here to some extent. Hotels are heavy purchasers of switchboards, maintaining, of course, private telephone exchanges. All of the best hotels place electric fans in their guest rooms, or would, if an effort were made to sell them. Electric appliances are numerous in hotel barber shops, which are usually conducted by the house, though occasionally sub-leased.

"In modern hotels, plugs have been installed in the rooms, so that guests, especially feminine patrons, may utilize electric hair-curlers and similar devices. In family hotels electric irons are sometimes provided, though in houses which cater to transient trade, the practice of doing the family wash in rooms is not yet welcomed. The manufacturers of an electrical instrument which transmits written messages from one department of the hotel to any other one desired has done a good volume of business recently in hotels of Chicago and elsewhere.

"Hotel men are now in some instances conducting garages in connection for the benefit of motorists. Just how far the hotel man will pierce this business remains to be seen. At least one boniface, however, is not only housing cars, but is charging those of the electric variety. This is but one instance of the trend of the times. . It would seem, therefore, that the hotel man is one of the biggest consumers of electric current and devices, and that the surface of this field has only been scratched by members of the electrical industry."—Harry M. Eastman, Managing Editor *Hotel Bulletin*, Chicago.

Ice and Refrigeration.

"According to reports received by *Ice and Refrigeration* recently, the business of manufacturing ice-making and refrigerating machinery and accessories has been picking up of late and the outlook is more encouraging, although the very untoward weather for ice manufacturing has had a considerable depressing effect on that branch of the industry. A matter of particular interest is the rapid increase in the use of electricity for power in the manufacture of ice. *Ice and Refrigeration* has recently published two or three articles descriptive of plants using electricity for power, a large plant of that character having been described in the August issue. In the September issue will be described another plant formerly operated by steam power and recently changed to electric power with very satisfactory results. In every issue of *Ice and Refrigeration* are published under 'New Plants and Improvements,' items referring to the installation of ice-making plants in connection with electric light plants or electric power plants, showing how the manufacturers of electricity appreciate the value of ice manufacture as a side line. Likewise items regarding the installation of refrigerating machinery electrically operated occur in every issue. These facts should certainly be of interest to the manufacturers of electrical machinery and appliances."—S. S. Van Der Vaart, Editor *Ice and Refrigeration*, Chicago.

Jewelry.

"There is a very hopeful feeling in the wholesale jewelry trade, and that this becomes more pronounced the farther you get from the eastern manufacturing states until you reach the Rockies.

"The Pacific Coast has always been regarded as a territory by itself in the jewelry business, and this year is additionally exceptional on account of the stimulus of the exposition at San Francisco, the distribution of travelers' money being felt from Los Angeles to Seattle.

"Small grains have been a record crop and in most cases the crop has already been gathered before the recent heavy rains. Corn and cotton may also be depended upon to add wealth to the entire section between Buffalo and Denver, and while the cotton crop has a smaller acreage than last year, feeding crops and food stuffs in general have been planted in such variety as to more than make up for this, because the sale of such crops throughout the year greatly reduces the indebtedness and consequently the money borrowed on growing cotton crops.

"Jewelers of the jobbing centers are therefore generally of the opinion that the coming twelve months must be vastly better than the preceding year."—

C. E. Walker, *The American Jeweler*, Chicago.

Lumber Trade.

"The lumber industry has probably been more seriously depressed during several years past than any other line of business in this country. It felt the panic of 1907 more promptly and seriously than almost any other and failed to recover with any promptness from the subsequent depression. In fact, it never has recovered entirely, although there was a brief period during which the industry was upon a fairly substantial basis of business volume and profits. For two years, however, it has been on a substantially level plane of extreme depression, with production steadily in excess of the demand and with prices which, on the average, have represented little, if any, return on standing timber, the raw material of the industry. It is recognized by financiers and students of business situations of the country that lumber producers and cotton producers are the greatest sufferers from business depression, and if these two could be put upon a basis of reasonable profit, the country would probably resume a condition of normal prosperity.

"This condition of the lumber industry, while due nominally to over-production, is in fact an example of the effects of under-consumption. To a considerable extent changes in requirements of other industries, whereby other materials have been substituted in considerable quantities for wood, are responsible for this situation; and yet it is largely due to the fact that lumber is more sensitive to general trade conditions than almost any other commodity. It is, in a sense, a luxury. People must eat, clothes wear out quickly, but the need for lumber, except in manufacturing industries, is seldom immediate or sharp. The farmer, the village dweller, the city merchant, can if times are depressed postpone building improvements for another year or two, and that they have done during these years when conservatism and economy have been so generally urged.

"What is the prospect for the future? The lumber trade looks forward to a fair volume of business this fall based, first, on the apparent disposition of the agricultural communities to loosen their hold on their money. The farmers, after several years when they have showed a buying interest in nothing but automobiles, at last seem disposed to make building improvements and otherwise spend their money in ways which will involve benefit to the lumber business. The character of orders coming from the railroads indicates that the transportation agencies of the country have reached a point where they must make some improvements or lose business, and that means the use of lumber. Then there is a growing activity in general manufactures, to say nothing of the special activity in war manufactures.

"These things all spell larger business in lumber, but we look for no boom until after the war is over. When that comes, and when Mexican affairs are settled, there will be, almost certainly, a temporary boom. Lumber will be wanted urgently and in large quantities. America, as the greatest lumber-producing nation, will be called upon to supply the immediate needs of many nations, but that demand is in the hiding of the future, and while it is one of the considerations that encourages lumbermen to hold on to their enterprises with grim determination, they are not counting on it as an immediate reliance. The best to be hoped for, as in sight, is an activity in the demand for their commodity which they hope will give them a modest prosperity.—Leonard Bronson, Editor, *American Lumberman*, Chicago.

"For several years the lumber indusary has been in a rather peculiar, not to say precarious position. It has been made the football of government investigations and later discriminated against, in having the entire duty abolished, permitting the entry of enormous quantities of lumber and shingles from Canada, so that the members of the industry have felt that they were getting it both a-comin' and a-goin'. Consequently when the real hard times came with the war and the greatest shifting of markets ever known in history took place, the lumber manufacturers and dealers were probably the most illy prepared of any industry to withstand all these handicaps, and suffered, we believe, more seriously than any. An enormous export trade to Europe was instantly shut off, damming up large quantities of lumber cut with especial reference to the wants of foreign buyers, and forcing it upon the domestic markets, to the demoralization of values. Vast quantities of lumber could have been diverted to South America, Africa, Australia and the Orient had bottoms been available, but ocean rates were sprung to a prohibitive figure, and our manufacturers were unable to market more than a fraction of their product outside of our own borders.

"Another burden upon the trade has been the tinkering with lumber freight rates in every locality, which has kept the trade in a state of continual unrest. Lately, in accordance with a recommendation made some time ago by the Interstate Commerce Commission, the railroads are proposing to reclassify lumber, putting dressed or remanufactured lumber on a higher rate than the rough product. This factor alone is sufficient to create in the trade a state of confusion and put a check upon development. The railroads, which consume annually about 10 per cent of our product, stopped the construction of freight cars. In the city of Chicago, which consumes annually five per cent of the total production of lumber in the United States, building operations were practically suspended for five months last year, and for three months this year on account of strikes.

"All of these matters have contributed to the most unsatisfactory condition that has ever existed in the lumber trade, it being found impossible to manufacture and sell lumber at a profit. In the last two or three years very few new mill plants have been erected, and most of those were erected for the purpose of replacing plants that had been burned. The modern saw mill plant is invariably equipped with electricity, many of them for all of their power and others using electrical apparatus in their planing mills only. Construction work being suspended, naturally the demand for electrical equipment in this industry has been extremely limited during the period mentioned.

"Within the last three months work on a number of large saw mill plants has been undertaken in anticipation of a turn in the tide of the demand for lumber. There are other plants now contemplated that will be erected this year, and all of these are and will be heavy users of electrical equipment of various kinds. However, the saw mill situation is far from normal, and it is doubtful whether, with the existing doubtful prospects, there will be much more construction work done in the near future than already planned. Members of the industry are hopeful, however, that something will occur to favorably affect this situation, and if there is any encouragement or hint of improvement the lumbermen will be found active in aiding the restoration of prosperity."—Lucius E. Fuller, Market Editor, *Lumber World Review*, Chicago.

"The lumber business of the Pacific Coast for the first six months of 1915 was from 20 to 25 per cent less than the corresponding period of 1914.

"The offshore decrease has been largely on account of lack of tonnage, while domestic business has suffered from the universal habit of banking interests refusing to advance funds for improvements.

"General business conditions throughout the Pacific coast are favorable, and when normal times prevail the demand for forest products will probably be of great magnitude.

"The use of electricity in the operation of saw-milling machinery has passed the experimental stage, and is gaining in popularity; the same statement applies to motor-driven machines in planing mills, box factories and other woodworking establishments, as such operation eliminates the friction load and by use of power only as required, reduces operating or power costs to a minimum."—Guy A. Buell, Editor, *Pioneer Western Lumberman*, San Francisco, Cal.

Marine Engineering.

"Probably no engineering industry in the United States is in the happy condition that shipbuilding is, especially on the sea coasts.

"When the war broke out a year ago shipyards were almost empty of work and the prospects were almost hopeless. Within three or four months ship owners realized that there would be a great demand for vessels to replace those lost by the belligerents, and we all know that there was a great demand for tonnage to carry American products to various parts of the world. As a result, orders began pouring in upon the shipyards and there is not a yard on the Atlantic coast that can take an order and guarantee delivery inside of two or three years. Indeed, these yards have work enough in hand and in sight to keep them running full capacity for at least five years. A very remarkable feature of the new ships under construction is that practically 250,000 tons deadweight of tank steamers are being built—to say nothing of a very large tonnage of ordinary merchant vessels. A significant feature of the situation is the fact that the Ward Line of New York has been obliged to place a contract for a new ship with a shipbuilding concern in Seattle, Wash., in order to secure fairly prompt delivery.

"Shipbuilding on the Great Lakes is very slow. Very few new vessels are under construction and shipbuilders

have had to depend very largely for the past year upon repair work to keep their yards busy.

"As electricity is necessary on board every steam vessel of the present day, you can readily see that the electrical industry so far as the marine field is concerned has been very fortunately affected. **The uses of electricity on board ship are steadily increasing, particularly motors for various purposes.** Furthermore, the building of so many vessels is very significant to manufacturers of incandescent lamps, as the ships in this country must use somewhere from eight million to ten million lamps.

"In other words, the industry represented by this magazine is running practically 100 per cent capacity on legitimate business without any trace of so-called war orders, and is sure to remain in this happy condition for years to come."—H. L. Aldrich, President, *International Marine Engineering*, New York.

Millinery.

"The millinery business is not quite normal in volume. The demand for hats decidedly less in value than in past years, accounts for part of the decline. Local conditions throughout the country affect the millinery business decidedly. In the localities where industrial troubles prevailed last year (and part of this) business is poor. In agricultural districts business is normal.

"In new plants, individual motors for each machine are installed. The old continuous shaft with belts to each machine has practically disappeared. The indirect lighting system is gradually superseding the exposed lamps in millinery departments in all parts of the country."—G. K. Glenn, President, *The Illustrated Milliner*, New York.

Mining.

"The writer recently returned from extended trips through the northern and western mining districts, where he found the electrification of mines, ore-concentrating plants, smelters, etc., proceeding on a scale which a few years ago would have seemed incredible. In the majority of cases, all new installations of hoists, compressors, pumps, mill machinery, etc., are now motor-driven and a great deal of new equipment is being changed over. Automatic and distance control has also become a feature of present operation. The activity now existing in the mining field exceeds anything known heretofore for the past eight or ten years. Extensive plans for new equipment are being made and the orders placed within the next few months will aggregate many hundreds of thousands of dollars. Most mining companies, as you know, have for some time past been getting along with just as little machinery and material as possible, but with the heavy demands made upon them for the production of ore and concentrates, it is now being found necessary both to replace worn-out or obsolete equipment and to make further installations of new apparatus in order to secure increased capacity, especially so at the present high metal prices. In this demand orders for electrical machinery and supplies will be prominent.—C. A. Tupper, Secretary-Treasurer, *Mining World and Engineering*, Chicago.

"The mine and reduction works of the United States are being operated at their maximum capacity, and in several industries the capacity has been, or is being, increased. Unfortunately, the great demand upon the mines and metallurgical works is, to a large extent, to furnish material required for military purposes. The consumption for domestic, peaceful purposes has increased somewhat, but is still far below normal.

"At present there is feverish activity in the production of iron and steel, copper, lead, zinc, and the minor metals. In lead and zinc production has probably been stimulated excessively by the high prices prevailing during the second quarter of 1915. I think that the outlook is, therefore, for a recession of prices and curtailment of activity, but probably the position of copper is much sounder than are the positions of lead and zinc."—W. R. Ingalls, Editor, *Mining Journal*, New York.

"The increased demand for the base metals, due largely to the consumption of them in the manufacture of munitions of war, is stimulating the mining industry. The big copper mines of Michigan, Montana, and the Southwest are working at full capacity and the zinc mines of Missouri, Oklahoma, Montana, Idaho, and Wisconsin are making the best of the abnormal price of spelter. Such electrical apparatus as is used in mines is sure to come into increasing demand in consequence of this general renewal of activity."—T. A. Rickard, Editor, *Mining and Scientific Press*, San Francisco, Cal.

Music.

"Electricity plays a very conspicuous part in the industries and trade devoted to musical instruments. It may be said that as a motive power electricity is employed to perhaps a more diversified degree in this department of human progress than in most of the others. Electricity is now employed, not only in the so-called automatic pianos, such as are used in public places and amusement resorts, but of late also in the larger musical instruments designed to reproduce the effects of small bands and orchestras. This phase of the musical-instrument industry is seen at its best in the so-called photo-players or movie-musicians, to be seen and heard in the larger photoplay houses. The coin-operated pianos are, of course, actuated by electrical motors. It goes without saying that in many of the piano factories the machinery is propelled by electrical power, the motors of varying capacity being used in all parts of the country where musical instruments are made.

"Of late years electricity is also employed in the publicity departments of the musical-instrument establishments. The piano store window is one of the most difficult to so arrange as to present an effective display, but with the aid of the electric light it becomes comparatively a simple matter to give to the instrument a suitable surrounding and to enhance the appearance of the store front by brilliant lighting. More and more, also, electrical signs are being used by the larger piano establishments throughout the country. The brilliant sheen of the well finished piano case lends itself perfectly to the electric light in attracting attention of passersby. Furthermore, the interest in the player piano is greatly increased by the visual movement of the action propelled by the unseen power. It is very common, especially in the smaller cities, to see and hear these instruments as they are electrically played in the music store windows. Of course the demand for small and specially constructed motors for player pianos increases with the growth of the player piano industry, and that now represents about 40 per cent of the American piano product.

"While, in common with most other lines of industry, the piano business, including the electrically operated instruments, has been somewhat below normal this year, the outlook is for a very speedy and rapid improvement. There are very few manufacturers of musical instruments in this country who do not confidently anticipate a good business beginning with the fall months and extending through the following year and, in this increase, as has already been clearly implied, the electrical instruments will play a very large part.—*The Presto*, Chicago.

Office Appliances.

"Hardly any industry is nowadays independent of electrical light and power. The office-appliances industry is a heavy user of both, for we have all manner of machines which are motor driven, such as letter-duplicating machines, addressing machines, adding machines, envelope openers, etc. As the use of such machines increases—and it is increasing right along—naturally this demand calls for an increased consumption of electrical power.

"In the lighting field, hardly any retail store can now regard itself as up-to-date which is not lighted electrically by the indirect lighting method. In factories where it is necessary to use artificial light, electricity of course is now one of the prime necessities, and great ingenuity and scientific skill have been displayed in using the electric light so as to bring out the greatest efficiency with the least eye strain.

"We regard the outlook in the office-equipment industry as very promising indeed. We believe the fall and winter of 1915-16 will show a steadily strengthening tendency in the demand for all manner of office machines, devices and supplies. Business for a year has been at a low ebb. We have now settled down to face those conditions which disturbances abroad have brought upon us, and we have ceased to be apprehensive of any immediate entanglement in European affairs. At last it would seem that the business men of the country have the government working with them instead of against them, or at least not proceeding in a manner calculated to obstruct the development of industry. We feel certain that the coming season will be one of satisfactory business in this and other lines."—H. W. Martin, Associate Editor, *Office Appliances, Chicago.*

Photography.

"Professional photography furnishes what the majority of people consider as more or less of a luxury; amateur photography is a hobby and is not vigorously prosecuted under unfavorable conditions of business or of weather. Business conditions in the photographic field have, therefore, generally speaking, been subnormal this year. The

war has caused unusual conditions in the trade, especially a marked hampering of imports, which are of considerable importance. Some American manufacturers have felt a stimulus to their business from this cause; other large firms, importers of either raw materials or finished goods, have suffered greatly. Generally speaking, however, the business conditions, among manufacturers, importers, and retailers, seems to be sound, and indications are not lacking that retail trade will readily respond to any improvement in general business conditions.

"Photography comes in contact with the electrical field at several points. There is a large and growing demand among portrait photographers for electrical lighting equipment of various types, to replace fluctuating and uncertain daylight, both in the taking of portraits and the making of prints. A continually increasing use of enlarging apparatus among amateurs and professionals, caused by the present vogue for small cameras, will react to the benefit of the electrical industry. An unlooked for development is the considerable use of the pocket flash-lamp, among photographers, for printing and darkroom illumination. The manufacturers in this field have not been alive to their opportunities, and although the great majority of dealers in photographic supplies sell flash-lamps, no firm in this field can see that it is to its interest to advertise these goods to the photographer."—F. R. Frapin, American Photographic Publishing Company. Boston, Mass.

Schools.

"The school field continues almost untouched from year to year because of the war and other conditions which confront ordinary trades and industries.

"If in anything, the attendance at school has been increased during the past year as a result of the war. This may seem peculiar. You must keep in mind the fact that a great many people go to school when times are hard to be able to earn more money when times are good.

"The use of electrical devices in schools is decidedly on the increase. Two schools in the West are being heated, lighted, etc., by electricity.

"The past year has seen an unusual increase in the number of schools that teach manual training. This means that the demand for electrically driven lathes, saw benches, planers, etc., is increased.

"It is perfectly obvious that electricity is the only practical motive power for schools since manual training rooms are used only a few hours a day, only five days in the week, and only nine or ten months of the year.

"Indirectly it is very much on the increase. With the extension of night school work, the demand for better lighting in school houses is making itself felt more and more every day. It is a remarkable fact that all sorts of industrial and technical courses are being offered by all sorts of schools and a very large percentage of this work is being done at night.

"In a great many schools, pupils are being taught to cook with electricity just as they would be taught to cook with gas or coal. While the greatest volume of this business is confined to the Pacific Coast, nevertheless the work is being introduced in other sections of the country.

"School boards are demanding more and more every year the use of auditoriums for all sorts of purposes. This means that more stages are being equipped for all sorts of purposes, which materially includes the various electrical outfits which are necessary for the staging of plays, etc.

"Such motor devices as vacuum cleaners, heating and ventilation apparatus is decidedly on the increase. While comparatively little is done with old buildings, every new building is being equipped with a vacuum cleaner, or a heating and ventilation system, which is practically always driven by motor.

"There were in the schools of the country last year twenty-two million children. The increase for 1915-1916 should be more than that, and with it there should come the normal demand for electrical apparatus.

The school field offers most attractive possibilities in the fact that money is always secure, and collections are always good, war or no war, hard times or good times."—Frank Bruce, *The American School Board Journal*, Milwaukee. Wis.

Shoe Findings.

"Business conditions in our industry change very little from year to year. Of course, there is the hue and cry of the pessimist, but most of the lines we represent being staple commodities, the consumer cannot do without them.

"Our manufacturers have had to contend with increased prices of raw material, which in some instances has resulted in increasing their own prices, especially in the leather trade, but if we can judge the general business outlook by the manner in which our advertisers are taking space in *Shoe Findings*, the coming season will be a prosperous one.

"More than 50 per cent of our readers own shoe repairing shops or departments that call for the use of electric motors. We have over a thousand wholesalers among our subscribers who act as distributors for such appliances. There are over twenty-five thousand prospects in our field who will some day buy an electric motor to be used in operating their repairing machinery."—Harry Schwarzchild, Editor *Shoe Findings*, Chicago.

Storekeeping.

"As you know, our magazine goes **exclusively** to the proprietors of general stores and small department stores in the smaller cities and towns. These dealers are largely dependent upon the farmer for their trade, and we find they are, almost without exception, very well satisfied and optimistic.

"The farmers have had nothing to complain of during the last twelve months, as crops have been heavy and prices high, a condition which seldom exists. This means that our subscribers are reaping their share of the money which is going to the farmer, and as a consequence are reporting an increase in business over corresponding months last year, and are buying liberally with the expectation of a good holiday trade.

"Just what effect this condition will have on sales of electrical apparatus, it is difficult to say. There is, of course, a growing interest among the farmers in electrical apparatus, and in the small towns in electrical plants, and prospects for good business will only encourage activities along this line."—O. F. Byxbee, Editor *Inland Storekeeper*, Chicago.

Sugar.

"The war has had a tremendous effect on the world's sugar industry. One-half of the total production is beet sugar, and 90 per cent of that half is produced in those countries which are fighting to the death. One of the combatants, the United Kingdom, produces no sugar, and previous to the war she took practically the bulk of Germany's and Austria-Hungary's surplus, with which countries she is now at war. The beet fields of France have been ravaged and its sugar industry interfered with. As a consequence the United Kingdom, France and Switzerland have been buying in markets new to them. This has tended to raise prices.

"The big sugar industry of Cuba has, as a consequence, had a successful season. New plants are going up all over the island and existing factories are being enlarged and improved. Incidentally, electrifying Cuban sugar factories is being given considerable and widespread attention. We ran a series of articles on electrifying cane sugar factories in our issues May to November inclusive, last year. This series was written by Wirt S. Scott, chief engineer of the Westinghouse Electric and Manufacturing Company. The articles attracted much attention and it is a common occurrance these days to hear that some plants either is installing electricity or considering doing so.

"As for the sugar industry in the United States—over it is hanging the black shadow of the Underwood tariff carrying free sugar in May, 1916. The sugar men expect a satisfactory campaign this fall, and as long as the war continues the home industry is safe, but under free sugar the industry is doomed. If the war had not intervened the factories would not have operated this year. It is a hard cold business fact that sugar made in America under the American wage scale cannot compete with that made by cheap European and tropic labor. Sugar cane in Cuba is almost a weed—it grows year after year with little more attention than that needed to cut it and get it to the mill. Beet farming is intensive farming and intensive farming with our high-priced labor means money. If we had Europe's wage scale: Russia, 10 cents a day for children, 17½ cents for women, and 24.9 cents for men; Austria, 20 cents for children, 26.8 cents for women and 30.2 cents for men; Germany, 22.8 cents for children, 28½ cents for women and 47 cents for men; if we could raise beets under this wage scale instead of an average in the beet fields of the United States of as high as $3.25 per day, there might be some reason for putting the American sugar industry against the world, but, as things stand the industry is doomed unless Congress, or rather the president, will reverse his policy toward it; and failing that a Republican administration at Washington."—E. A. Jones, Editor *Sugar*, Chicago.

Telephony.

"The telephone industry, about which you request an opinion in your letter of the 10th inst., is exhibiting a gradual upward tendency, as viewed from

the manufacturers' and supply dealers' standpoint. The low point was passed some time ago and reports now indicate continual improvement and that normal conditions will prevail by next spring.

"The operating telephone companies were, of course, affected to some extent by the war, but not as much as other industries. With the general improvement in business throughout the country, net earnings in general are greater than those of last year. There is every reason to believe that the telephone companies, in common with the general broadening out of business, will also expand and come into the market as in former years."—S. R. Edwards, Editor, *Telephony*, Chicago.

Textiles.

"Manufacturing conditions in the cotton textile line have been gradually improving since the beginning of this year and with a few exceptions mills are well employed. These exceptions are in colored-goods lines where the trouble is not a shortage of orders, but a shortage of dyestuffs. The first of September will undoubtedly see curtailment in some colored-goods mills which have heretofore been operating full time. The reason for this will be an attempt to conserve some of the present dyestuffs in order to keep their operatives at work through the winter months at least on part time. Until such time as the general public are willing to accept colored goods dyed with fugitive colors, or until such time as a greater supply of fast color dyes can be secured, this curtailment of the colored-goods mills must be expected.

"In the white lines business is exceptionally good, particularly in those lines which are being benefited by the so-called 'war orders.' However, the fine goods mills of New England have put more fancy, fine quality dress goods on the market in specialty form during the past few months than ever before in the history of the mills. These goods are high-priced goods, many of them running well over 32½ cents to 42½ cents a yard at wholesale. They are being manufactured in great variety and large volume.

"Ever since last April a note of optimism has been in evidence in the cotton-goods industry and the new mills under construction in the South at the present time, as well as hundreds of mills that are adding new machinery or replacing old machinery with a better and higher grade, emphasize this fact perhaps more strongly than any production figures which may be advanced.

"A great deal of this new construction is being electrically driven, although not always with purchased power. The new $500,000 Fairfax Mill of the West Point Manufacturing Company, at West Point, Ga., for example, will be driven from a central station owned and operated by this company on the Chattahoochee River, from which power is also furnished to the Langdale Mills and Shawmut Mills of the same corporation. I published an illustrated description of the Erlanger cotton mill at Lexington, N. C., in the March, 1915, issue of *Cotton*, which is another type of electrical mill recently constructed in the South. Their current is generated by a steam-driven turbogenerator of 1,500 kilowatts capacity, and individual motor drives are used throughout the mill, 1,100 separate motors being used in the weave room alone.

"Lighting systems in many mills are being remodeled and the old long cord suspension carbon lamp replaced by the higher powered lamps hung on short cords and equipped with reflectors.

"It is, I believe, becoming better understood in all lines textile, that with the ending of the war more active competition than has ever before been received will be encountered. The warring nations are learning that women and children can do many things heretofore done by men and at the close of the conflict the abject poverty and gigantic taxes will necessitate the active work of every able-bodied person of both sexes with a consequent increased production of goods, which will be marketed at probably the lowest prices known in present years, in order to regain trade lost during the present crisis.

"It is probably because many cotton manufacturers at the present time realize these facts and are preparing for them, that so much new and up-to-date machinery is being put in the mills to replace that which is older and less efficient, and which has been in use for a number of years past.

"Export markets are being investigated and promoted and these new markets will call for more and more goods as the lines become firmly established and the purchasers become better acquainted with American products. Particularly is this statement true of knit-goods markets and with the vast opportunities in the knit-goods trade now open to this country, which have formerly been supplied almost entirely with the German products, there seems to be no limit in sight when considered from the standpoint of quantity.

"Personally I believe the textile industry of this country is today upon a bigger, broader and stronger basis than ever before in its history, and the present time might be termed a "get ready" period, which will be followed by the largest general business boom in the history of the country."—L. L. Arnold, Editor, *Cotton*, Atlanta, Ga.

"In common with other divisions of the business world the textile industry has been affected during the past year by war conditions both favorably and adversely. In the first place, had it not been for the war it is probable there would have been a flood of imports that would have been disastrous to the operations of textile mills and to the marketing of domestic products. The influx of this merchandise began before the war started and continued in spite of the influences working against increased importations. Naturally, as the conflict progressed demand for equipment for the armies of the belligerents has caused the placing of orders in this country for an aggregate volume of merchandise which, though possibly exaggerated in reports, has been sufficient to keep machinery in operation that otherwise would have been idle. These demands except in certain periods of inactivity have been the mainstay at least of the woolen manufacturer and have extended into other lines, such as underwear, hosiery, and into certain lines of cotton goods. Renewed interest has been evident of late from various governments, evidently preparing for another winter campaign and the outlook is for even larger purchases than those already made.

"An incident of these war orders which has been unfortunate for the textile industry has been the criticism in the daily press of deliveries that were not acceptable to the purchasers and the intimation has been that manufacturers have endeavored to palm off merchandise not up to specifications upon foreign governments. This, with a very limited number of exceptions, has proved to be untrue. The fault has been with the intermediaries who have been responsible for the placing of these orders. They have not furnished complete particulars in many instances, and in others have calculated upon a demand from official sources that did not materialize. Fortunately, this condition does not apply to all foreign governments which have been in the market for the purchase of supplies. The majority have conducted their operations in a businesslike, systematic manner and have profited thereby. Where the opposite is true merchandise has in instances cost purchasers more than was necessary. At present, however, these unfortunate conditions seem to have been eliminated with regard to future operations.

"Generally speaking, operations by textile buyers during the last twelve months have been most conservative. In the woolen trade up to the opening of new lines for the spring 1916 season more or less machinery has been idle and it has been a difficult matter to inject life into the operations of the buying trade. Beginning with the first of July, however, a more encouraging condition began to make its appearance and has progressed until sellers are eminently satisfied with the character of buying for the current period. In fact, orders by the clothing trade have been numerous enough and of an extent to lead to the belief that they smacked of speculation. Under existing conditions, however, it would seem as though purchasers of men's wear fabrics particularly were warranted in providing against future contingencies. The status of the raw-material market has been such as to indicate not only higher prices, many of which have already been realized, but a decided scarcity in certain lines. The embargo on wool for a period led to the fear that supplies for manufacturers would be very difficult to secure. Although wool today is coming in under license there are certain qualities that are not available, but this dearth is offset by increased quantities of other wools to which this market is not accustomed. The effect of the presence of these wools is not fully determined as yet, but it is believed that their admixture with domestic qualities and well known foreign lines will make for the betterment of fabrics rather than otherwise.

"Prices, naturally, on new spring lines of woolens show an increase. The advance, however, has not been abnormal figured on the increased cost of production and buyers have accepted the new level of quotations philosophically. There is every indication that the original prices for the season are likely to be the lowest prices; already advances have been announced in certain quarters and the fact that lines in many instances are sold up would evidence the necessity for higher quotations as the season progresses.

"In the cotton-goods division of the market the trade has had unusual prob-

lems to confront. The distribution of last year's cotton crop was effected with much less disturbance than was thought possible. While prices of raw material declined, yet the exports were of such volume as to eliminate fear of disastrous consequences and the market level reached a point where distribution was possible at a profit. Naturally, prices for fabrics have been irregular, owing to the fluctuation of raw material. For the most part, however, mills have been able to operate at a close margin of profit and there has not been the idle machinery that many feared.

"At the present writing the trade is faced with the problem of cotton being declared contraband of war. Whether the assurances of the Allies that some method will be devised whereby any surplus will be absorbed and a disastrous slump prevented will be sufficient to prevent chaotic conditions only the future can decide. No marked change has resulted so far from the startling announcements of the last few days and the fact that buyers' stocks are in small compass is an element in favor of comparative regularity.

"Naturally, the problem of dyestuffs has been most apparent in its effect upon the manufacturer of cotton goods. Larger relative quantities are used by these mills and consequently strenuous measures have had to be adopted in order to meet unusual conditions. Dependent upon supplies from Germany whence imports have not been received since April, unusual efforts have been made to develop a domestic dyestuff industry. So far these efforts have been only indifferently successful, whatever may be the ultimate outcome. There seems to be little likelihood at present of a change in the attitude of Germany toward shipment of dyes to this country. Undoubtedly Germany has used the dyestuff situation as a club to modify, if possible, the blockade of her ports by England through her Orders in Council. As long as England will not permit shipments of cotton from this country to Germany, just so long will the movement of dyestuffs to this country be held up. Manufacturers, however, are endeavoring to make the best of the situation and are successful in many instances in keeping their machinery running by using substitutes and conserving the small supply of dye materials which they have on hand.

"Export trade has been of very limited volume in cotton goods during the year, the absence of demand from China, where the influence of Japan has been most disastrous, being one of the principal factors in this lessening business. Comparatively small results have been achieved in the South American market and while certain new outlets have been developed they have not been sufficient to offset the decline in other directions."—V. E. Carroll, Managing Editor, *Textile Manufacturers' Journal*, New York.

Transfer and Storage.

"An electrical man's first impression of the transfer and storage industry as a field for electrical equipment would be that it does not amount to much, but a little thought and a little investigation would soon convince him otherwise. The transfer and storage men of the country use enormous quantities of electrical supplies every year, and the prospects are that the demand in this field will steadily increase for it is an industry that is just beginning to wake up and to find itself.

"Among the carters of package freight to and from railroad terminals and steamship lines, the transferrers of baggage to and from railroad stations and residences and hotels, the haulers of heavy machinery, safes, etc., and the movers and storers of household goods and merchandise, of the United States and Canada, business has not been good during the past year. The cartage people have suffered because general business has been bad and little freight has been moving; the baggage transferrers because people have not traveled as much as usual, and firms have not had as many salesmen on the road; the heavy haulage concerns have felt the general depression and the movers and storers of household goods have not had as many people to move.

"However, all of the indications for the coming months point toward decided improvement. There is more freight moving, general business is better, money is pouring into the United States from Europe and must soon be felt in every line. The outlook for a good fall season in the moving and storing of household goods is better than fair.

"The entire industry is awakening. In spite of the depression last year, there has been unprecedented activity in the erection of new stables, and new storage warehouses. There is a growing demand for more sanitary and modern stables—some of the cartage firms have as many as 1,200 horses in use—and in the storage industry, everyone is talking 'fireproof' storage, which means new buildings in a great many cases. In all these building projects electric lighting equipment and electric elevators play a prominent part.

"Many of the owners of horses use electric motors for running oat crushers, hay choppers, woodworking machinery and machine-shop machinery, for they have their own wagon and blacksmith shops. The storage people use a large number of electric motors for woodworking machinery, for cutting and trimming lumber for packing. There should be an increasing demand for motors for this purpose during the coming year.

"But the principal application of electricity to this field has as yet been scarcely touched. I refer to the use of the electric motor truck. The transfer and storage field is without doubt one of the greatest existing fields for the electric commercial vehicle for practically 80 per cent of the work done is haulage and most of this is short-haul work, over city streets. One of the New York City furniture warehousemen recently made the remark that if he could afford it he would throw out his entire horse equipment and substitute electric trucks. A large Brooklyn warehouse has recently done this very thing and it may confidently be expected that, with the steadily increasing cost of horse maintenance, there will be a big demand for electric trucks during the coming year. The electric vehicle is the proper solution for most of the haulage problems in the transfer and storage field."—H. T. Lay, Managing Editor, *Transfer and Storage*, Pittsburgh, Pa.

Woodworking.

"Business in building and in house furnishing has not bulked big for some time. Events in the woodworking lines are now more rich of promise.

"Trade in general, though too largely built upon war demands, is bringing here a lot of money which will, through labor alone, filter to every part of the body industrial.

"Immigration is dull. Workers are uneasy. Wages unstable. Recent strikes show tendency of times.

"When war ceases there will be a lively commercial awakening abroad. Labor there and here will then be scant. Demand for improved labor-saving devices, for better light, and for more convenient and speedy appliances—such as electrical power and lighting apparatus—will be actively insistent, enlightened and enlarged. Your field will be a winner."—Rob I. Clegg, Editor, *Wood Craft*, Cleveland, O.

Resistance of Radiotelegraphic Antennas.

A suggested explanation of increase of resistance of radiotelegraphic antennas which has been observed under certain conditions where the wave length is increased, has been offered by L. W. Austin in a paper on the subject issued by the Bureau of Standards.

The resistance of radiotelegraphic antennas may be divided into three parts—first, the ohmic resistance of the wires; second, the so-called radiation resistance; and third, the so-called earth resistance.

Up to the present no satisfactory theory of ground resistance has been developed. The experimental curves of antenna resistance, on account of the decreasing radiation resistance, fall rapidly at first, as the wave length is increased, and then as the wave length is further increased remain nearly constant, if the ground conditions are good as in the case of a ship's antenna, or again rise nearly in a straight line, if the ground conditions are poor. This rise may be very rapid in the case of peculiarly poor grounds. For instance, the resistance of the Bureau of Standards antenna rises from 13 ohms at 800 meters wave length to 38 ohms at 2,000 meters.

Great difficulty has been found in explaining this increase of resistance with increasing wave length, but it is believed that the antenna system must be looked upon as a condenser, the antenna itself being the upper plate and the ground water the lower plate. Between the ground water and the surface there is usually a layer of semiconducting material, which would correspond to a poor dielectric in the case of an ordinary condenser. It is well known that the dielectric losses in imperfect condensers generally increase in proportion to the wave length of the current employed in the measurement. It is found that by covering the surface of the ground under and around the antenna with a wire net, thus making the lower plate of the condenser, ground losses nearly disappear.

INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS.

Annual Convention, Cincinnati, O., August 24 to 27.

Concentric wiring and its use in America, one of the subjects discussed at the twentieth annual convention of the International Association of Municipal Electricians, held in Cincinnati, O., August 24 to 27, perhaps was accorded the closest attention of any of the subjects by the delegates and others who attended the convention.

Many excellent papers were read and attracted more or less discussion and a great deal of business was transacted during the sessions of the Association, it being the opinion of nearly all of those present that the convention just closed had been one of the most profitable from every point of view the Association has ever held.

The attendance was fully up to the average and the faces of many new members were seen, showing that the work of the officers of the Association to broaden its scope and increase the membership, both active and associate, is bearing fruit. Every bit of space in the room provided for exhibit purposes was occupied and a number of those contemplating exhibiting were unable to obtain space, so great was the demand.

Baltimore was selected as the meeting place for 1916, following the earnest efforts put forth in behalf of the "Monumental City" by J. B. Yeakle, superintendent of Fire Telegraph of that city and one of the old members of the Association. The election of officers resulted in no change being made, President Flandreau, of Mount Vernon, N. Y., Secretary George, of Houston, Texas, and Treasurer Diehl, of Harrisburg, Pa., being re-elected by a unanimous vote. Several new names are seen on the Executive Committee and it is anticipated that it will result in the increase in the scope of the work of the Association and that further interest will be awakened in city electricians, superintendents of fire and police alarm systems, electrical inspectors, as well as all interested in the electrical field generally, not only throughout this country, but in Canada and other foreign countries where the membership extends.

Among the prominent men of the profession present at the convention was the first vice-president of the Association, Dr. Charles P. Steinmetz. Not only did Dr. Steinmetz take a prominent part in the discussions on the various papers, but showed in many ways that he is heartily imbued with the spirit of the Association and an earnest advocate of its purposes and policies. Several times he went out of his way to express his great admiration for the Association and his appreciation of the value he placed on his membership in it. He received much attention from Cincinnatians generally during his stay.

Tuesday night the members of the Association were welcomed to Cincinnati by Mayor Spiegel and representatives of the Chamber of Commerce, responses being made by Dr. Steinmetz, Will Y. Ellett, of Elmira, N. Y., and J. B. Yeakle, of Baltimore. The latter, in the course of his remarks, introduced Miss Cora Lucille Thompson, daughter of William Thompson, city electrician of Richmond, Va., as the "Daughter" of the Association.

In his talk, Mr. Ellett took occasion to refer to those city electricians who obtain their positions through political pull as men who very seldom attend a meeting of the Association and said that "the only man worth while is the chap who holds on to his job through a changing administration because of sheer ability." Mr. Ellett, together with James F. Zeluff, of Paterson, N. J., and Adam Bosch, of Newark, N. J., all of whom were present, were three of the men who helped organize the Association in Brooklyn, N. Y., in 1896.

The real business began Wednesday morning, when President Flandreau read his annual address, referring to the work already accomplished and outlining that for the future.

He advocated a membership committee, consisting of one member from each state and urged that a census be taken of those engaged in electrical work, also that every city electrician in the country should be a member of the Association.

Following the reading of the paper by R. A. Smith, of Norfolk, Va., on "The Advisability of Using Concentric Wiring in this Country," there was an animated discussion on the subject. The object of this style of wiring, which is said to be in wide use in European countries, is to cheapen the cost of wiring, especially in what is known as branch circuit work, in the smaller class of homes and in the suburbs of large cities. Mr. Smith said that the rules suggested by him had not been approved, but were simply suggested. The adoption of this system would enable electricity to be largely substituted for oil and gas, he said.

In this connection, it was stated that an electric lighting company in Little Rock, Ark., had attempted to introduce the concentric system in that city, but that the citizens did not seem to favor that style of wiring.

Before any action is taken on this system, it will be fully investigated by a committee from the Association.

A paper on "Fire-Alarm Systems for Industrial Plants," by Albert J. Cross of New York, was read, advocating the use of such systems in industrial plants and referring to the benefits to be derived from their use. Many such systems are in wide use throughout the country, some of them being very complete.

In this connection a discussion arose on the subject of sprinkler alarms, the prevailing opinion being that it is best for such alarms to come into fire-alarm headquarters before being sent out to the fire department. The discussion covered a wide range and was participated in by many of the electricians. The opinion also prevailed that in most fire departments it is better to respond to sprinkler alarms, even if trivial, rather than run the risk of a conflagration. The Association went on record as favoring fire-alarm systems for such plants.

At this point G. Francis Gray, of Schenectady, N. Y., read a paper on "Lightning Arresters," which went thoroughly into the subject and treated it from practically every standpoint.

W. J. Canada, electrical engineer of the Bureau of Standards, Washington, D. C., read a paper on "The Scope and Present Status of the National Electric Safety Code," and said that a conference would be held in Washington on October 27, of state commissions, municipalities and national associations, when the National Electrical Safety Code, which the Bureau has been engaged in the preparation of for the past two years, will be persented for final amendment, ratification and adoption for a year's trial.

The paper, a lengthy one, went fully into the subject, and brought out a considerable discussion. The Code was generally endorsed, as being a move to effect standardization in all lines of industry. Mr. Canada intimated that the rules would probably apply to both old and new work, as old construction cannot always be abolished. A committee of three from the Association will attend the conference, R. A. Smith, of Norfolk, Va., A. C. Farrand, of Ventnor City, N. J., and W. S. Fastnacht, of York, Pa., being named to represent the Association.

Following a discussion as to the Association's status with the National Fire Protective Association, it was decided to have the organization fully represented in that body. The Association is already represented on the signal board, and will also be on the Electrical Committee, which has in charge the preparation of the Code for final consideration.

S. E. Doane, of Cleveland, O., who recently returned from Europe, where he went to investigate concentric wiring, made the following statement: "There are different rules of practice on both sides of the Atlantic. Abroad, the smaller customers are sought out, while in this country, the companies have been averse to carrying small

customers as a profit could not be made. It is a question of less expensive wiring. Concentric wiring is in my judgment the neatest scheme put forward to connect the dynamo with the lamp. It is also the best and cheapest, entailing the least cost of insulation. It is simply a rubber covering on No. 14 wire, with a coating of paper around it, all inclosed in a copper tube. The wire is not laid in a wall, but on the outside, although usually concealed by paint and wall paper. The only fittings are at junction points. There has been a general impression that this system is a general panacea for all electric ills, but this is not so, the system being principally for small residences, suburbs of cities, etc., where a cheap cost of construction is desired."

Mr. Doane expressed the opinion that ultimately the concentric system of wiring would come into general use in this country, as the cost of installation is one-third that of the present forms of wiring. Samples of this new form of wiring were on exhibition.

In the general discussion that ensued, electrical "pirates," incompetent workmen who suddenly leave an occupation, buy a few tools, and claim to be electricians, were condemned as being poor workmen and a discredit to the profession generally. "They put wiring in a house cheaper than a reliable contractor can buy the material and I am in favor of having only licensed electricians do such work," said President Flandreau.

A paper, with demonstration, of "Practical Cable Maintenance Methods," was given by O. F. Tallman, of St. Louis, who showed an easy method of discovering leaks, etc., wherever they might exist.

H. M. Beck, of Chicago, in a paper on "Storage Batteries for Fire and Police Purposes," went into the subject in an exhaustive manner, giving the details of construction and maintenance. He said there are many who have storage batteries who find methods of their own by experimenting and by experience to maintain them up to a high state of efficiency. It was shown that batteries in one instance run down had the polarity reversed, which brought them up to original value in current output. It was shown that this treatment after several graduated charges had produced good results, and that when the charging current was put back to its original pole, i. e., positive to positive and negative to negative, as the batteries were intended to be charged, it was found that batteries had been rebuilt by this process, and excellent results obtained.

"The Work of the Bureau of Standards," including an account of the cooperation of the bureau with municipalities in securing electrolysis mitigation and improving electrical service and meter accuracy, was presented by Burton McCollum of the Bureau of Standards, Washington, representing Dr. E. B. Rosa, chief physicist of the Bureau, who was unable to be present.

The paper went into detail in describing the work of the Bureau and what it expected to accomplish in the future. It was exceedingly interesting and was illustrated with stereopticon views.

Dr. Steinmetz remarked that the government appropriation for the work of the Bureau was totally inadequate and hoped the Association would use its influence toward obtaining more recognition for the Bureau.

The paper on "Uniform Electrical Standards," by Dr. John Price Jackson, of Pennsylvania, was presented by J. Herman Kinseley, of Harrisburg, Pa., and was a plea for uniformity in standards pertaining to everything electrical. In the discussion that followed, W. J. Canada of Washington said, "Speaking for the Bureau of Standards, we appreciate the strong appeal for national standards. Dr. Jackson has the benefit not only of long engineering experience, but also of contact with life hazards which his connection with the largest state industrial commission has given."

One of the most interesting papers brought to the attention of the convention was that of W. H. Flandreau, of Mt. Vernon, N. Y., president of the Association, on "The Responsibility and Importance to the Public of the Office of Municipal Electrician or Superintendent of Fire and Police Telegraph." He made a plea that the men in charge of the fire and police-alarm signal systems throughout the country be paid salaries commensurate with their calling, stating that "upon these men depends very largely the safety of the public, in keeping down losses of life and property by fire, and in maintaining the efficiency of the police service." In the discussion that followed, Dr. Steinmetz urged the city electricians and fire and police-alarm superintendents to keep the public fully informed on those subjects, stating that the more the public knew of those matters, the more they would support their requests for larger appropriations. He also believed that more efficient results would be found where fire and police-alarm systems were maintained separately from fire-department control.

Price I. Patton, second assistant manager of the Electrical Bureau, Philadelphia, in speaking on "Police Patrol and Fire-Alarm Records," described the method in use in Philadelphia in keeping such records, which received much favorable comment.

One of the most interesting papers brought to the attention of the convention was that on "Standards for Fire-Alarm Installations," by F. A. Raymond, of New York, of the National Board of Fire Underwriters, which was followed with close attention. Mr. Raymond stated that the paper was intended as a basis for discussion of fire-alarm systems for cities, rather than an attempt to lay down any fixed rules. He referred to the different classes of street boxes, of the improvements made in fire-alarm systems and made numerous suggestions for still further improvement in the receiving and transmitting of alarms, care of battery rooms, etc.

He stated that when the National Board of Fire Underwriters began to investigate and report on fire-alarm systems, it found no fixed standards and no scale by which the relative merits of any fire-alarm installation could be determined.

In the discussion that followed the suggestion was made that an approved list of fittings for fire-alarm boxes be prepared by the Underwriters' laboratories, but no definite action was taken on the suggestion.

C. E. Convers, of San Antonio, Texas, read an interesting paper on "The Fallacy of Placing Fire and Police-Alarm Wires in Telephone Cables," in which he advocated the use of separate cables for fire-alarm purposes.

L. S. Brach, of Newark, N. J., read a paper on "Lightning Protective Apparatus for Fire and Police Telegraph Circuits," in which was mentioned the many benefits resulting from their use.

Walter Bischoff, of Chicago, made a talk on "Jovianism" and spoke of the coming observance of Electrical Week, which is to be general throughout the country and urged upon the electricians the importance of being members of the Order.

Reports of various committees were adopted and ordered printed, and embraced reports of the Committee on the Grounding of Boxes, recommending that the Association should not go further than it already has gone in placing itself on record favoring a ground.

The Committee on Overhead Line Construction reported progress and stated that it was desirable to extend the work beyond the general recommendations made at the last convention, for the reason that the National Bureau of Standards in preparing the safety code which will deal with this construction, and the Association is co-operating in the preparation of the same and further action will be postponed until the National Electric Code is issued by the Bureau of Standards.

The report of the Electrolysis Committee represents data and recommendations of the Bureau of Standards and the committee was continued.

The Committee on Municipal Lighting reported that such a committee can be of great value to the members of the Association whose departments have jurisdiction over such matters. Among the subjects recommended to be considered is that of an analysis of street-lighting rates, in order to find the most equitable and intelligent method of determining the price that should be paid by a municipality for public lighting, at the same time allowing the utility company an equitable return on the actual investment.

Before adjourning resolutions were adopted praising the hospitality extended by Cincinnati, especially by D. H. Fisher of that city, chairman of the Arrangements Committee, Fire Chief Bunker, Mayor Spiegel and the citizens generally, it being the universal opinion that the convention was one of the most successful ever held.

Election of Officers.

The following officers were elected to serve during the coming year:

W. H. Flandreau, president, Mt. Vernon, N. Y.

Dr. Charles P. Steinmetz, first vice-president, Schenectady, N. Y.

Frank T. Brooks, second vice-president, Indianapolis, Ind.

C. E. Convers, third vice-president, San Antonio, Texas.

L. S. Bosley, fourth vice-president, Springfield, Ohio.

Clarence R. George, secretary, Houston, Texas.

C. E. Diehl, treasurer, Harrisburg, Pa.

The new Executive Committee is composed of: Robert J. Gaskill, chairman, Fort Wayne, Ind.; John Thomas, Scranton, Pa.; D. H. Fisher, Cincinnati, Ohio; R. C. Turner, Atlanta, Ga.; Jos. Macaulay, St. Paul, Minn.; Emil Schmidt, Rochester, N. Y.; W. H. Thompson, Richmond, Va.; C. F. Gaul, Louisville, Ky.; W. P. Briggs, New Bedford, Mass.

Exhibitors.

Westinghouse Electric & Manufacturing Company. J. I. Brett, manager Cincinnati office, in charge. Showed metallic flame and flame carbon arc lamps, also Mazda C lighting fixtures.

L. S. Brach Supply Company, Newark, N. J., represented by Mr. Brach. Showed lightning arresters, terminal blocks and introducing traffic signals.

Economy Fuse & Manufacturing Company, Chicago, represented by A. L. Eustice, A. E. Tregenza and H. S. Day. Showed Economy renewable cartridge fuses.

Manhattan Electrical Supply Company, of Chicago, represented by F. J. Foster, of Cincinnati. Showed Red Seal dry batteries.

H. W. Johns-Manville Company, represented by H. L. Steiner, manager Cincinnati office. Showed fuse devices, fiber conduit, batteries, friction tape and meter-protective devices.

American Steel & Wire Company, represented by members of the Cincinnati office. Showed lead cable and bonds.

Gamewell Fire Alarm Telegraph Company, represented by C. F. Maulin of the Chicago office and O. P. Crocker, general agent. Showed six-circuit automatic storage-battery switchboard, new type Peerless positive non-interfering high-tension current-resisting fire-alarm boxes; also new types of punch registers, time stamps, police signal apparatus and various devices for calling patrolmen who are patroling their beats.

Safety Insulated Wire & Cable Company, M. B. Austin & Company, district managers, represented by Arnold Friend, of Chicago. Showed Safety fire and police cables, steel-tape cables, which are being extensively used without conduits.

Western Electric Company, represented by Jack Nolloth, of the Cincinnati office, and G. M. Crammond, Showed line of P. B. X. boards, and police and mine sets. Also a standard line of common-battery sets and lead-covered insulated telephone cable.

Kellogg Switchboard & Supply Company, represented by E. A. Woodward, of Chicago. Showed combined telegraph and telephone equipment, operating on same circuit without interference. Also central-office equipment, switchboard of improved type, controlling a number of circuits.

Star Electric Company, represented by J. W. Mackay, F. F. Stover and Ollie Doolittle, of the Chicago office, and E. D. Fay, of Newark, N. J Showed a 10-circuit repeater, engine-house set, register, time stamp, take-up reel and fast time register for six blows per second. Also six styles of boxes, three styles of gongs and a 12-circuit switchboard.

General Electric Company, represented by G. Francis Gray, of Schenectady, N. Y. Showed vacuum lightning arresters, high-frequency testing oscillator, multigap and compression chamber lightning arresters for 2,300-volt circuits. Also incandescent and arc lamps for street lighting.

Large New Telephone Exchange Building for Chicago.

What will be one of the largest telephone exchanges in the world is now being completed by the Chicago Telephone Company at 6041 Kenwood Avenue, Chicago, Ill. It will take the place of the present Hyde Park Exchange located at 5723 Dorchester Avenue.

The original equipment will be adequate to serve more than 25,000 telephones, which is a larger number of telephones than there is in the whole city of New Orleans, La., or in Jersey City, N. J., and more telephones than are in service in the countries of Greece, Portugal, Servia and Bulgaria combined.

The "A" switchboard of the exchange, where all incoming calls are received, will have positions for nearly one hundred operators and extend in a continuous line as long as half a city block. The distributing frame, where the cables containing the wires that connect subscribers' telephones terminate, is the largest frame of its kind ever installed.

Three separate exchanges will be housed in the new office building—Hyde Park, Midway, and Blackstone—and the structure is large enough to care for three additional exchanges, which it is expected will be required.

The new building is four stories in height, of brick and reinforced concrete and, like all the other exchanges of the Chicago Telephone Company, thoroughly fireproof, affording the greatest measure of protection to operators and other employees.

Electric Heating and Heat Storage.

An article by M. Semenza in *Elettrotecnica* deals with the subject of electric heating under conditions where heat storage is necessary, so that a demand will not be put upon the power plant at times of peak load. It is aimed to utilize energy for heat during the night and through storage to make this available during the day.

A comparison is made with a central hot-water heating system and it is assumed that heat will be required during a period of 120 to 140 days during the year. It is found that an exceedingly low rate for electric energy is necessary to compete with the hot-water heating system. The cost of apparatus, its installation and the provision of necessary capacity in the distributing system are important items on account of the shortness of the period of utilization.

The author concludes that this method has not great possibilities under present conditions in Italy.

The use of various materials for use in heat storage is considered. For a room having a volume of 100 cubic meters, it is necessary to accumulate every night 28,000 large calories. The materials considered for this purpose are water, cast-iron, bricks, cement and granite. While the other materials may be used at higher temperatures, he concludes that water whose limiting temperature is only 100 degrees centigrade, the most satisfactory substance.

Electrical Construction

An Electrical Contractor Who Practices What He Preaches.

It is a well known fact that the professional man's profession never quite extends to himself; a doctor who is never sick, a dentist with perfect teeth or a reverend's children who are paragons of virtue are among the many examples to prove this contention. Under the same general heading we have the electrical dealer who hopes to introduce electrical devices into the homes of his community and who uses gas for light and cooking, lets his wife turn the washer by hand, fans himself during the summer months with a piece of cardboard on a stick, and otherwise adheres to the customs of his fathers, meanwhile attempting to educate his fellowmen in the "Do-It-Electrically" doctrine. E. P. Smith, of Dubuque, Iowa, is an electrical dealer who is the exception that proves the rule.

Mr. Smith has made his home electrical from cellar to garret. The lighting system starts at the curb where a boulevard post of special design stands sentinel. The illumination of the home and garage is solely electrical, taking the form of direct and indirect systems according to conditions met. Special circuits for emergency or burglar lights, controlled from several locations, light five lights on the outside of the house, and all the lights in every room in basement, first and second floors.

The Home.

A two-horsepower stationary vacuum cleaner in the basement, with a remote control switch on every floor, keeps the house clean. In winter the rooms are heated by a hot-water boiler with electric thermostatic control, and in summer they are cooled with twelve-inch fans permanently fastened to the walls of the various rooms and eight-inch portable fans that are capable of being placed where needed. The water supply, which is heated in the summer months by an electric water heater, is furnished by a water cistern with an automatic electric control pump. The laundry is equipped with an electrically driven washing machine, an electrically driven and heated ironing machine, an electric iron and electric clothes dryer.

The Pantry.

The cooking is done on individual units, which have been provided for by equipping the kitchen and dining-room tables with plugs and receptacles. The dining room is also furnished with a special electric cabinet with sufficient equipment to cook a light meal. In the sewing room a motor runs the machine and an electric iron has been provided for light pressing. The piano is played by means of a special electric attachment, current for which is supplied by a motor generator set. A ten-station Interphone system provides instant communication between any two rooms in the home and between the home and garage. The garage is electrically lighted and is equipped with a one-half-horsepower motor which does grinding and polishing work.

The entire electrical equipment, which was furnished by the Western Electric Company, serves not only to lighten the work of the Smith household, but has the added distinction of serving as a permanent exhibit by which Mr. Smith is able to demonstrate conclusively and prove that the electrical household appliance is as necessary as it is practical. When a prospect says: "Well, it looks all right here in your store, but I don't believe it'll work in my home," he is promptly taken to the Smith home, where he sees that particular device at work. The bills for current consumption are open for his perusal and he has but to ask the domestic to get first-hand information regarding results obtained with the devices. Mr. Smith is convinced that his scheme is the best for real sales results and it remains for the other electrical dealers to try this system of practicing what they preach that they too may be able to reap the benefits in increased sales.

The Sewing Room.

Grounding Insulator Circuits.

In a paper in the *Elettrotecnica*, G. H. Semenza reports experiments upon grounding the supports of insulators in concrete cellular switching compartments in order to discover whether this practice gives the results expected or whether it increases the hazard.

It is generally feared that an accidental contact between a high-tension conductor and the wall of the cell will be dangerous for a workman when the circuits have not been grounded. But the author's experiments show that for voltages as high as 61,000 these fears are groundless.

On the contrary, the author considers the practice undesirable as introducing a greater likelihood of interruption to service, since an arc-over is rendered easier in case of excessive voltage.

During the first year's operation of the Panama Canal, which ended August 14, 1915, there passed through the canal 1,317 ocean-going vessels.

Wiring and Conduit Work at the Panama-Pacific Exposition.—II.

By A. A. Willoughby, Pacific Coast Correspondent.

Type of Cable.

After the plans for the underground conduit network had advanced to the point of being ready for constructional details, the engineers next took up the question of working out the type and voltage of the distribution cables and the location and type of transformer stations at the terminals of these cables.

Studying closely the relative merits of the 2,300-volt delta-connected as against the 4,000-volt four-wire star-connected distribution system, the advantages offered by the latter in the saving in cables and the fact that it possesses the utmost flexibility in absorbing the various characters of loads which would be imposed on it, led to its selection as the standard to be used. It was evident from the beginning that the loads were entirely too scattered and too small in quantity at any one point to consider any higher voltages. It will be shown later in this article how well this type of distribution has served the Exposition purposes. In fact, it developed later on considerably more advantages than the engineers had anticipated.

On reaching the decision to use the 4,000-volt system, it was determined to install three-inch Linaduct as being the maximum size necessary to handle 4,000-volt 4/0 three-conductor cable, this being the largest size which was indicated for use in connection with this work. The system is installed mainly in three-inch conduit, with the exception of a certain number of two-inch ducts, principally located in the State and Foreign Section. The two-inch duct was installed with a view to handling the secondary and telephone services and the grounded neutral for the four-wire system. When the time came for actually ordering the cable, the engineers representing the Exposition and those for the power company, gave close attention to the selection of a cable which would serve all the Exposition requirements and still give the power company as much latitude as possible with a view to its future use. The very liberal and broad-minded manner in which the contract was interpreted by the principals on both sides, resulted in the final agreement which was mutually advantageous to the power company and the Exposition. After comprehending the extent of the requirements of the Exposition for cables, it was noted that the power company was likely to become stocked with an altogether disproportionate amount of 4,000-volt cable, although this cable is standard in some portions of its power district. The heavy loads in such places as San Francisco and other points about the bay has forced it to the use of 11,000-volt cable as a standard for city transmission. Consequently the engineers for the power company proposed that they furnish instead of the 4,000-volt, the 11,000-volt cable at the same cost price, with a view to having a more usable product at the conclusion of the Exposition period. The situation became complicated through the fact that the three-inch conduit lines of the Exposition had been laid over the major portion of the grounds and were not of a sufficient diameter to accommodate the 11,000-volt standard round cable. To meet this difficulty, the power company ordered for the Exposition use, an 11,000-volt cable of the sector or clover-leaf type, which is admirably suited to this size of conduit. In the main trunk lines which had not been installed at this time, 3.5-inch conduit was used in order to accommodate a certain amount of the 11,000-volt round type of cable which the power company desired for future use. In numerous runs in the cable system it was found inadvisable to use the higher-voltage cable, on account of the short cable runs which could not be salvaged for future use and these were of the lower-voltage cable.

The result of the whole arrangement was that the Exposition secured an installation with an unusual factor of safety as far as dielectric strength is concerned, and the Pacific Gas & Electric Company secured the desired absorption balance between the 4,000 and 11,000-volt types as would later be used in their own system.

As will be noticed from the diagram of the cable system as installed, Fig. 5, a number of these were in the nature of ties or connections from one transformer station to another. A great many of these cables could have been of smaller size, but again the influence of the contract is shown, it being impractical for the power company to absorb cables of smaller sizes in their local distribution system. In addition to the 4,000-volt network which was the main source of supply for the Exposition consumption and to cover requirements for concessionaires and participants, it became necessary to run two 11,000-volt No. 2 three-conductor cables to serve the two 1,000-kilowatt motor-generator sets and the two 250-kilowatt sets for supplying direct current to the Exposition searchlamps and for special power circuits to industrial exhibits. These motor-generator sets were supplied under the apparatus contract with the power company, the 11,000-volt synchronous motors being a standard unit in its system. The 11,000-volt cables supplied for this work by it were old cables pulled out from the power company's earlier distribution systems elsewhere and were re-leaded for use on the Exposition work.

Transforming Stations.

When the question of transformer stations was first considered, the amount and character of the loads to be handled were absolutely unknown factors. Though the amount of territory to be covered was known with certainty, the Exposition palaces laid out and the amount of aisle and exhibit spaces definitely determined, the solution of the problem was arrived at by allotting to the exhibit area, certain assumed loads per square foot of floor area and to the State and Foreign Section by assuming a certain percentage of area occupied by buildings, on a similar basis.

The amusement-section load was based on loads of similar concessions at other expositions and at amusement parks. The problem in the amusement district was solved by running two aerial lines along the service road at the rear of the concessions' buildings, it being only necessary to hang transformers on poles and structures as required. In the Exposition palaces and in the State and Foreign Section, the problem resolved itself into an estimated balance of cost between the amount of secondary distribution required in these districts as against the additional cost of installing more frequent transformer stations. With the assumed loads as a basis, a system was laid out which utilized to the fullest commercial extent the very favorable contract for leased apparatus and primary cables and minimized, to a great degree, the heavy investment in large distribution secondaries.

In order to comply with the insurance requirements, which was the governing factor in the design of the type of transformer stations used, it was necessary to build these stations of concrete along the outer walls of the main exhibit palaces, with their only opening to the outer atmosphere. These transformer stations or vaults,

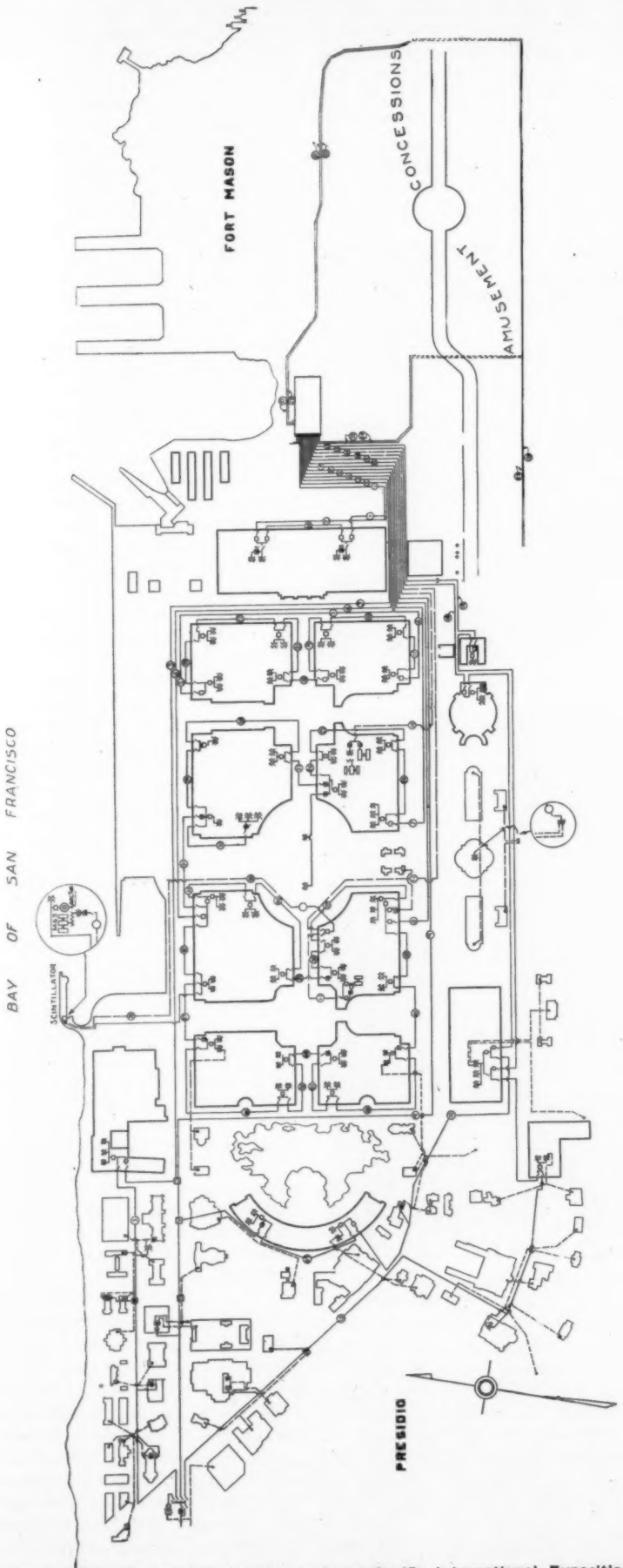


Fig. 5.—Diagram of Cable System, Panama-Pacific International Exposition.

as they are termed, are inaccessible from the interiors of the buildings, but have a ventilating stack which was run up from an inner corner of the vault roof to the roof of the building proper. The door leading to the terraced space in front of the building was made of wood, covered with tin sheeting, hung on an inclined runway by means of rollers, and being held open normally by a fusible underwriter's link. In addition to this door, an outer ventilating door, made of expanded metal, covers the opening and is kept locked to exclude intruders. These vaults were located in the corners of the exhibit palaces, there being from two to four of the stations to each building, dependent on the load conditions.

In the State and Foreign district the vaults were not located in every building, as it was easily seen from the preliminary plans that some of these loads would be very slight. Vaults were located in buildings having the heaviest projected load and were used as secondary distribution control points for adjacent buildings of lighter load characteristics, the main conduit system being used as a distributing medium.

In the design of the interior of these stations the chief consideration was a layout of the utmost simplicity, yet with sufficient wire capacity and floor space to meet the necessary changes in transformer size which the engineers knew would surely have to be made when the final connected loads were known. The principal factor that influenced the design of the interiors was the fact that the power company supplying the transformers requested that all transformers used be of the pole type, as this was the only type in such small sizes that could be utilized in that system. In a very few cases where the loads were unusually concentrated it became necessary to use transformers of the station type in sizes ranging from 100 to 200 kilowatts each. In all cases, however, transformers of the self-cooling type were used.

The scheme adopted, as shown in Fig. 6, was a single weatherproof busbar, supported by glass insulators on a wooden framework, this framework being cantilevered out to support the secondary wiring of the transformers. This framework also serves to support the simple pole-type transformer fuses which were used. The design provided for one bank of lighting transformers and one bank of power transformers, although later developments made it unnecessary in all cases to use both banks. For economy's sake, where the motor load was very light, the small motors were connected to the lighting transformers, as the

transformers were banked in star and the 220-volt motors were connected to the 208-volt outside wires of the star lighting mains. Motors as large as 10 horsepower have been successfully run from these mains without unduly disturbing the lighting service.

Secondary Distribution.

As has been mentioned in the earlier portion of this article, the distribution system. In the main exhibit palaces, however, the concentration of loads due to the large number of consumers, made it necessary to run secondary distributing mains for both light and power. In the eight chief buildings, these mains were run underneath the exhibit space floors, there being an excavated basement varying in depth from 5 to 7 feet beneath these buildings. These mains were run independently from each transformer vault and were purposely not interconnected so as to localize as far as possible any interruptions to exhibitors' service, this advantage being considered of more importance than the slight saving in copper that would be effected by interconnecting the secondary network.

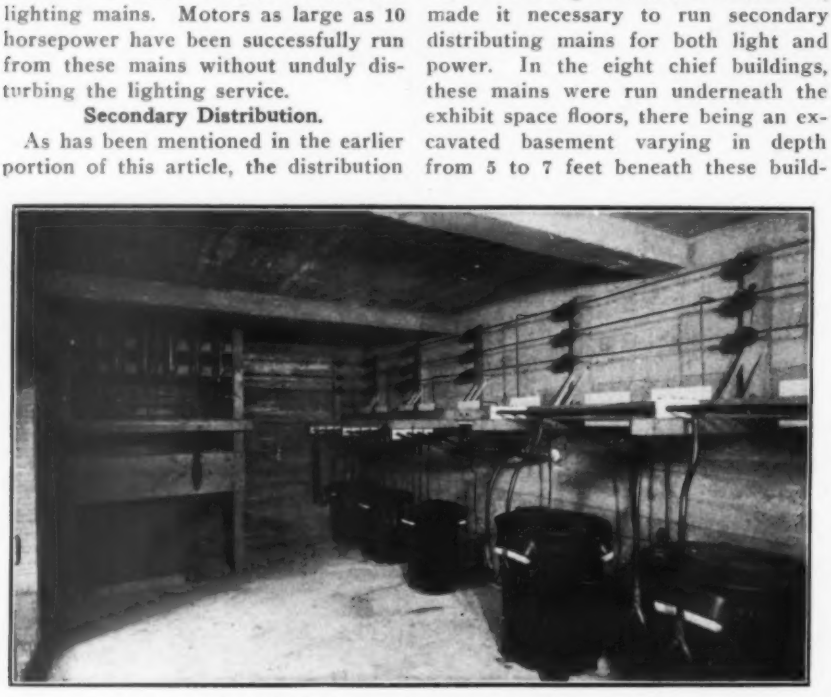


Fig. 6.—Typical Lighting and Power Transformer Banks.

Fig. 7.—Derrick Used in Handling Transformers.

in the amusement section is by means of overhead 4,000-volt pole lines in the rear of the concessions buildings. The secondaries were run along building walls and over roofs by means of brackets and framework along the usual lines employed for this class of work. In the State and Foreign Section the distribution was accomplished from transformer vaults located in the larger buildings, the distribution being handled through the main conduit

The power mains were run from 220-volt delta-connected transformer secondaries and the lighting mains from 120-volt four-wire three-phase star-connected transformer secondaries. The control of both the power and lighting buses is by means of knife switches, mounted on simple wooden racks bolted to the face of the concrete transformer vaults, the leads from the transformer being brought through the wall in a sealed tube. This carried out the idea of isolating the vaults from the buildings proper as recommended by the underwriters. The flexibility of the four-wire three-phase lighting mains was such that by balancing between the exhibit loads, it was possible to carry the lighting circuits in single-phase, three-wire two-phase, and four-wire three-phase, and the power circuits in single-phase and three-wire three-phase, all connected to the single set of mains. This was a most important development in the cost attached to making the numerous minor services in the exhibit palaces.

In order to economize on meter installations, a set of rules was promulgated for the main exhibit palaces which required the exhibitors to connect to a single phase of the lighting mains for loads up to 5 kilowatts; to two phases of the lighting mains for loads up to 10 kilowatts, and to make four-wire three-phase lighting connections for loads over 10 kilowatts. Single-phase motors up to one horsepower were allowed connected to the lighting mains and three-phase 220-volt motors of larger sizes were permitted to connect with the lighting mains for purposes of economy where the loads on these motors would not disturb the regulation of the adjacent lighting circuits. In the Palaces of Machinery and Horticulture and the exhibit section of the California Counties Building, where no basements existed, the mains were run along the horizontal bracing trusses and supported by porcelain cleats, the same type of distribution obtaining as in the eight buildings of the central group. All wire used in these mains was of the weatherproof variety, which offered the advantages of lower first costs and equal salvage in weight of copper.

In the design of the lighting mains in the various Exposition palaces, their size was determined by balancing the projected day load that would be imposed by consumers and by the Exposition's daytime activities against the night illumination load and the janitor lighting which comes on after the consumer's load has disappeared. There is a very slight overlapping of the customer's load due to cleaning up in individual booths, but as the main exhibit palaces were planned to and

do close at six o'clock, the bulk of the day load is off before general illumination begins.

Metering.

The question of selecting the type of meters to be used in metering the Exposition current consumption was of vital importance to the engineers of the power company, because the character of the Exposition consumers' loads was in so many cases so radically different from the character of the loads on the power company's system. The Exposition engineers, knowing that all meters must be ultimately absorbed into the permanent commercial installations of the Pacific Gas & Electric Company, gave the engineers of the latter company the amplest latitude for selection of types that were consonant with commercial accuracy in metering. The consequence of this arrangement was that the Exposition in most cases used three-wire meters on two-wire single-phase installations. In order to give the power company the benefit of more meters of smaller capacity than could be used on the Exposition system, a large number of 25-ampere three-wire meters were cut over at a very small cost with coils in multiple, giving the equivalent of 50-ampere single-phase meters, which was the size mostly used on the Exposition loads. The meter readings in these cases had to be multiplied by the constant 2 due to the current coils receiving only half the normal supply. The total expense of making both the initial and final change in these meters is approximately 60 cents per meter.

With the conventional plan adopted of dividing the loads into 5 kilowatts for single-phase loads, 10 kilowatts for two-phase loads, and over 10 kilowatts for three-phase loads, the meter situation was very much simplified. Due to the unbalance that must necessarily occur in loads of exposition character, single-phase metering was used throughout and following the above divisions of loads: the 50-ampere, two-wire meter or its equivalent serves about 90 per cent of all exhibitors' load connections. This was of very considerable advantage in minimizing the number of square meters.

All consumers were required to build wooden or metal boxes of approved design and size, these boxes being equipped with hasps for sealing and small glass panels set into the door opposite each meter dial. This plan served the two-fold purpose of preventing unauthorized persons from tampering with meters and gave the Exposition's meter readers a view of the dial without having to open the meter box. The general plan of handling consumers' installations was to have the consumer run his service from this meter box to the Exposition mains, terminating at the mains in a metal fuse box and allowing sufficient wire for a meter loop at one end and for connections to the mains at the other end, the Exposition's service department having to do only the actual work of connecting in the meter and making the service taps. The services were required to be run in conduit within the main group of Exposition palaces and in the State and Foreign pavilions, but in the concessions' district, which is served from aerial pole lines, the services were run in open weatherproof construction, except the usual service pipe entry to the building proper.

(To be continued.)

Electrolysis Mitigation in Springfield and New Elyria, Ohio.

A forthcoming publication on electrolysis mitigation in Springfield, O., is one of a series of technologic papers issued by the Bureau of Standards on this subject. The aim is to reduce the damage done to city water and gas mains, underground telegraph and telephone cables, etc., by stray currents from electric railway lines. It is shown how, by the use of a specially designed copper cable system, improved rail bonding, and suitable cross connection between different railway lines, the leakage currents in these underground structures were reduced so that the damage by stray currents is now practically negligible.

The report also contains recommendations that should be followed in the future, both by the railway companies and by the city authorities, to maintain these satisfactory conditions. It is the aim of the Bureau that this definite and detailed report upon the problem of electrolysis mitigation in Springfield will be of service to other American municipalities that have to deal with similar problems, which in their early stages need careful engineering investigation rather than ill-considered legislation for their solution. The paper was prepared by Messrs. McCollum and Ahlborn.

Changes in the feeding distances of the power house are recommended in the preliminary report on electrolysis mitigation in Elyria, O., made by Burton McCollum and K. H. Logan in the form of a paper which has been issued by the Bureau of Standards.

From data furnished by the city and the Cleveland, Southwestern & Columbus Railway Company, the feeding distances of the Elyria power house are found to be too long and the potential gradients too high. It is recommended that the gradients be reduced to 0.3 volt per 1,000 feet average for 24 hours by the addition of a substation, the interconnection of the tracks of the two electric railways, and the installation of an insulated return-feeder system.

The saving in power due to the reduced feeding distance is shown to be more than sufficient to pay the annual charges on the additional investment of $34,373. The plan provides for 800 kilowatts additional substation capacity, improved operating conditions, and substantial elimination of electrolysis.

Copies of this report may be obtained by application to the Bureau of Standards, Washington, D. C.

Building Congress to be Held in San Francisco.

The National Association of Builders' Exchanges at its convention in Columbus, O., last January, fixed the week of October 18 to 23 as American Builders' Week, to be observed at the Panama-Pacific Exposition in San Francisco.

Elaborate preparations are being made in the latter city to properly carry out the objects of this convention. It will be of importance not only to builders, but to those interested in allied trades, such as the electrical contractors.

The ballroom at the Inside Inn will be the Association headquarters, while the opening ball on the evening of October 18 will be held in the new auditorium at the Civic Center. A reception will be held during the week at the California State Building and on the evening of Saturday, October 23, there will be a grand banquet at the Palace Hotel.

Additional information regarding American Builders' Week can be obtained from the Publicity Committee, General Contractors' Association, 110 Jessie Street, San Francisco, Cal.

Voltage Diagrams of Autotransformers.

C. D. Salda in *Elettrotecnica* develops the diagrams for voltage in a step-down autotransformer, pointing out that in a transformer with two separate windings the magnetic flux decreases from no load to full load, whereas in an autotransformer operating at constant voltage there is an increasing from no load to full load for any type of load, whether inductive, non-inductive or with leading current. This applies especially to transformers with a ratio less than two to one.

Philadelphia Mardi Gras.

The electrical interests of Philadelphia are arranging for a Mardi Gras celebration to be held at the athletic grounds of the Philadelphia Electric Company on September 11. A similar affair was held last year and proved a big success. It is expected this year to excel the record of last year.

National Association of Electrical Inspectors.

HUBERT S. WYNKOOP, President, 1574 Fiftieth Street, Brooklyn, N. Y.
WASHINGTON DEVEREUX, Vice-President, 131 South Fourth Street, Philadelphia, Pa.
WILLIAM LINCOLN SMITH, Secretary and Treasurer, Concord, Mass.
R. P. STRONG, Representative on Electrical Committee of National Fire Protection Association, 809 Hibernian Bank Building, New Orleans, La.

Executive Committee

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"LET THE CODE DECIDE."

Fuses for Alternators.

Question 308.—Why are not alternating-current generators and their exciters required to be protected by fuses or other equivalent devices?

Answer 1(O). In the 1905 edition of the Code there first appeared the exception referred to. The Code previously required all constant-potential machines to be protected by "a safety fuse or equivalent device of approved design." When this exception first appeared in the Code it had become standard practice with central stations to use alternating-current machines generating at 1,100 or 2,300 volts; and the fact that there was not then, nor is there as yet, any listed fuse or circuit-breaker specifically approved for over 600 volts, would be one fairly good reason why the use of such a device is not required.

Answer 2(K)*. Because from the design of the machine it is quite improbable that sufficient current could be generated at any speed to cause injury to the machine or its windings.

Answer 3(P)*. Because the interruption of the circuit by the blowing of a fuse would cause more damage than would the troubles resulting from the absence of fuse protection.

Answer 4(R)*. Due to the construction and the general characteristics of alternating-current apparatus excessive overload is not so injurious as would be the case with direct-current machinery. The modern procedure in the power station is to insert in series with the alternator a reactance, so proportioned as to limit the current to a fixed value, say 200 per cent overload. Smaller generators in this vicinity are generally arranged for no-voltage and overload relay protection. The necessity of re-synchronizing synchronous motors, etc., makes it imperative for continuity of operation, to keep alternating-current systems always alive.

Answer 5(L). To answer this question in the space allowed would be impossible. Would suggest the author of this question can obtain full and complete information by study of any of the books on alternating currents and their phenomena.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

Answer 6(T). Because of the inherent qualities possessed by an alternating-current generator it is not considered necessary to protect it, especially as a protective device would be liable to be opened frequently by momentary heavy synchronizing current, if generator was operated in parallel with others. The quick opening of such devices is also liable to give rise to instantaneous high voltages on system. The quick opening of an exciter circuit is liable to prove injurious to field winding of generator.

Answer 7(B)*. The characteristics of alternating-current generators and their exciters are such that it is not advisable with the modern types of apparatus to use fuses or other equivalent devices for the protection of same. In case of trouble on the modern types of machines, while the current for a fraction of a second jumps to ten or twelve times its normal load, it drops back to something under three times its normal load, which the machine can take care of until the attendant has an opportunity to cut same out of operation. If circuit-breakers or similar devices were used for the protection of this type of machine in stations, they would be a source of annoyance from their operation when machine was out of synchronism with other station apparatus.

Answer 8(M). Alternating-current generators are not required to be protected by fuses or equivalent devices for the following reasons:

1. Alternating-current generators are usually found in power stations and then under competent supervision. In the event of trouble in the generator the operator would disconnect the machine from the bus by opening the oil switch.

2. It is not practical from an operating standpoint to have a machine disconnected from the line by a circuit-breaker in the event of an overload of short duration.

3. If the overload were a "dead short" the operator would disconnect the line upon which the trouble appeared to exist.

4. If the generator were to be relieved of its load suddenly there would be a momentary rise of potential that might puncture or break down the insulation of the generator winding.

5. A generator driven by an engine with a sluggish governor would "race" if the load were suddenly relieved, and likely harm the equipment.

In the case of exciters for alternating-current generators:

1. If an alternating-current generator were to lose its field the generator would be relieved of its load, which from a point of operation is not very desirable.

2. Fuses or equivalent devices are not required, as the load on an exciter is constant and supplying the current for excitation is usually the exciter's only function.

Answer 9(J). The outgoing circuits from an alternator should be protected with fuses or circuit-breakers installed on feeder panels. The impedance of the common type of alternator is such that a short-circuit of brief duration is not liable to injure it; hence, any protection further than this is not usually necessary. Moreover, where alternators are to be operated in multiple, fuses or circuit-breakers would be objectionable because of their liability to open under the action of cross-currents when an incoming machine is being thrown on the busbars.

When alternators are running in multiple the blowing of an exciter fuse might leave one machine without excitation and with the voltage of the others impressed upon its armature. As a safeguard against this fuses are generally left out of exciter circuits.

Answer 10(F and G). There appear to be several reasons for not requiring alternating-current generators to be fused or equipped with other similar devices, among which are the following:

When we consider the great amount of inductively wound apparatus connected to alternating-current generators we can readily appreciate the destructive high-potential surge that would occur if the circuit was suddenly opened at the peak of the current wave, which might happen if fuses are used.

If alternating-current generators are connected in parallel there is sometimes a surging of current between the two machines. This condition rectifies itself as the machines get in proper step, but if fuses were used to operate near normal current, first one machine and then the other would go out and shut down the plant, and any fuses used would have to be so large that they would lose their effectiveness.

The armature winding of an alternating-current generator has a very high inductance compared with a direct-current generator. This inductance is caused by the higher frequency and the method of arranging the winding. The inductance causes an armature reaction which tends to weaken the field magnetism and reduces the effective voltage when the current is increased. This condition is more readily understood when we consider the series arc machine, which has an armature reaction high enough to reduce the voltage and limit the current flow to a point very little above normal, even under short-circuit conditions, so that unless the field strength is increased the current flow from the machine is restricted.

In regard to the omission of fuses for the exciter, it is common practice to place all generator fuses on the switchboard. This leaves the mains between the generator and the board unprotected, and experience appears to justify this method. Under these conditions it is not necessary to fuse the exciter or the exciter mains. Under no circumstances are fuses required in the field circuit of motors or generators. From the above we can readily see that fuses are not necessary in any part of the exciter circuit. It might also be incidentally mentioned that if the exciter circuit opened during parallel operation of the alternating-current generators it might result in a shutdown of the entire plant.

Answer 11(H)*. I do not know, but believe they should be protected in some way.

Answer 12(N).* As to the exciter it is most important that the field of the alternator should be maintained. Further, the exciter is relatively small. The alternator field is a heavily inductive load, and if suddenly opened by a blowing fuse is likely to be punctured, so that altogether it is more judicious not to fuse the exciter circuit. If some protection appears necessary it can be provided by arranging for the automatic weakening of the exciter field.

As to the alternating-current generator, if of low voltage it is wisest to fuse each outgoing feeder circuit. In higher-voltage machines fuse or protect on the line side of the transformers in a similar way. The reactance of the armatures (together with suitable current-limiting reactances) will protect the machines long enough for the operator to take any necessary steps and will avoid the dangerous possibility of a sudden rupturing of an inductive circuit on the crest of the wave.

Fuse in Grounded Generator Lead.

Question 309.—Why should the fuse be placed in the grounded lead when a generator has one terminal grounded, as referred to in Rule 1d, fourth paragraph? Does this refer to railway generators, and why is the exception made for electrically driven generators?

Answer 1(O). The fuse is required in the grounded lead of a generator on a two-wire grounded circuit, so that it will surely be in circuit no matter at what point an accidental ground may occur on the other side of the circuit or even in the machine itself. The rule finds its principal application in street-railway work. If the generator is driven by a motor, adequate protection can be secured by the motor fuses.

Answer 2(K)*. (a) Because if fused on the non-grounded side and the fuse should blow, the machine windings would be placed under stress to ground, which might rupture the insulation. In that event the circuit would be again completed from ground, through machine windings (or a portion) to ground with no fuse protection interposed. The same is also true of an accidental ground occurring on the machine side of the fuse.

(b) Railway generators are included in this rule.

(c) It is assumed that the protection on the motor side of electrically driven generators will protect against excessive current in the generator.

Answer 3(P)*. Do not know.

Answer 4(R)*. A generator, not electrically driven, is certain to be clear of the liability of stray currents from a grounded system. Placing the protection in the grounded lead prevents any part of the system, fed from such a generator, being alive to ground in case of a short-circuit opening such protection. Overload protection is generally secured on all feeders in railway work.

Answer 5(L). This question is difficult to answer in these columns, as the author has tangled up grounded terminals and grounded neutrals of three-wire systems on electrically driven balancing sets. Would again suggest that a little study in any of the standard works will enlighten him.

Answer 6(T). In reference to rule 1, section *d*, fourth paragraph, I cannot find any exception made to railway generators, and would say that same should apply if generators supplying railway systems are other than electrically driven.

Answer 7(B)*. The requirement that fuse be placed in the grounded lead when generator has one terminal grounded, is so that all current shall pass through said device, which might not be the case were it connected in the other lead permitting part of the current flow to shunt through the equalizer.

Answer 8(M). Rule 1*d* does not refer to railway generators. The exception is made, no doubt, because of the protection afforded the generator on the motor side. Railway generators are usually 600-volt machines which will sustain an arc, and as the circuit-breakers are connected in the positive lead and the negative lead is grounded on the track, protection is afforded in the event of a grounded wire or object coming in contact with the lead of positive polarity. If the fuse or circuit-

breaker were placed in the grounded lead, the generator would have no protection, other than the relays on the motor, in the event of a ground coming in contact with the positive lead.

Answer 9(H)*. I can see no good reason for fusing the ground leads.

Answer 10(N). There are many reasons for this requirement; it certainly does apply to railway generators, and the reasons may most simply be summed up by saying that experience obtained in the early days of such railway working demonstrated that a higher degree of protection was thus obtained. As to the exception of electrically driven generators: Assume the generator to have 95 per cent efficiency at full load of 100 kilowatts and 90 per cent at 25 per cent overload; at this latter point it will call for an input of 140 kilowatts or a little less. This 140 kilowatts will be the motor output and if we again assume 90 per cent efficiency the motor input will be 156 kilowatts. We must protect the motor, and unless this is unreasonably large, it is obvious that its fuses must always let go before the generator reaches the danger point, while the elasticity of the set will prevent their letting go under a very brief generator overload (the momentum of rotating parts supplying the requisite energy for a brief space of time), whereas fuses in the generator outgoing side might let go and cause a loss of voltage on the lines it was supplying. This is, of course, undesirable.

I do not feel, however, that this applies except in the case of individual drive, as in case of several machines driven by one motor large enough for all together the reasoning would no longer apply. This, however, would be a very exceptional and usually inefficient arrangement, and I think is not contemplated in the rule.

Answer 11(F and G). When a generator has one terminal grounded, a fuse placed in the circuit between the machine and the ground will protect the generator in addition to the insulated wire, whereas if the fuse is inserted only in the ungrounded terminal, the generator has no protection against excessive current in event of the winding of the machine being accidentally grounded. Railway generators are included.

I believe the exception for electrically driven generators only applies when driven by individual motors. The reason for not requiring fuses in the generator leads under these conditions is probably because the motor fuses can be depended upon to operate if any abnormal quantity of current flows from the generator.

Public Service Commissions

Conducted by William J. Norton

IDAHO.

The Great Shoshone & Twin Falls Water Power Company applied for and was granted leave to adopt a form of application for electric air-heating service and contract therefor, together with rules and regulations adapted to such service.

Where heating service is furnished the customer all electric energy used by the customer is to be purchased from the company. The rules state that the heating service will not be supplied in excess of the station capacity available for such service, and explains that "the furnishing of electricity for air-heating service is possible only because the company now has station capacity and distribution equipment available during the winter months, for the use of which no remunerative service can at present be obtained. Such electricity, therefore, is in the nature of a by-product, and a limited amount is offered for air-heating service pending the time when a more remunerative service can be had."

The Great Shoshone & Twin Falls Water Power Company and the Southern Idaho Power Company have filed schedules of rates for incandescent municipal lighting service. The rates of both companies are as follows: $26 per light per year for 100-candlepower units, $38 per light per year for 250-candlepower lights, $44 per light per year for 400-candlepower lights, and $52 per light per year for 600-candlepower lights. The schedule of the Great Shoshone Company was filed for the towns of Amsterdam, Berger, Bliss, Bruneau, Buhl, Filer, Gooding, Glenns Ferry, Hagerman, Hammett, Hansen, Hazleton, Hollister, Jerome, Kimberly, King Hill, Marion, Milner, Mountainhome, Peavey, Oakley, Shoshone, Twin Falls and Wendell; and the Southern Idaho Company, for American Falls, Blackfoot and Pocatello.

MAINE.

The Rumford Falls Light & Water Company asked for approval of a contract under which it desires to furnish electricity to the town of Mexico for street-lighting service. The proposed contract is for a rate less than the regular domestic lighting rate, and for a fixed term.

The Maine public utilities law permits a public utility "to make a contract for a definite term, subject to the approval of the Commission." The Commission says: "Contracts for comparatively long terms between a public utility and its customers, whereby a particular individual or corporation seems to be securing an advantage over a smaller customer, are not now favored by legislatures or public utilities commissions. In the past such contracts (sometimes written and sometimes oral 'gentlemen's agreements') constituted the methods by which rebates and other special and unwarranted advantages were obtained. It was to make such practices impossible, or at least unlawful, that the legislatures in nearly every state during the last seven years have passed public-utility acts and created commissions to assist public service corporations in doing away with the necessity of these special agreements, and to so arrange matters between the corporations and the public that all business dealings should be carried on in the open, each having a full, mutual understanding of the acts and the rights of the other, and each having in the Commission a friend to whom he could at all times go with full confidence in finding a patient ear, a ready though just sympathy, and a full, calm and judicial hearing and decision."

The Commission says that these are cases in which the welfare of the utility, its prospective customers, and the public, require certainty as to the future rate for a particular service. "Frequently the establishment of an enterprise depends upon the certainty of its being able to secure power at a known cost for an extended period. In other cases, where a change of the character of power used is contemplated, the user

must know what the future cost will be.

"In still other cases, and the present is an example of this class, a prospective consumer of large units, must determine whether he will generate his own power or purchase from some established utility." * * *

The consumer may be in a position to generate power as a by-product of his regular business, or, as in the case of municipalities, may forego a return on the investment. "None of these considerations would warrant special rates or especially favorable terms to such prospective users. No person may be given a lower rate to induce him to use the current, or to prevent his generating his own power. This decision is to be read with this always in mind.

"But such consumers afford an opportunity for larger producers of power to dispose of what otherwise would go unused. If this surplus energy is sold at any price above the cost of production and transmission, it returns some profit to the utility. To that extent also it assists the general public in carrying the overhead charges of the utility. If a contract is approved which does not promise its full pro rata of the utility's fair profit on its business as a whole, it will be on the ground that it takes care of its surplus product, and no such contract should be presented where it is reasonable to expect that the same units of product might have been disposed of on terms more consistent with the return of approximately the same percentage of profit lawfully enjoyed generally by the utility on its output." * * *

"And so long as the price is sufficient to return some profit to the utility, and is open as long as the utility has current to supply without injury to the general public dependent upon it, it is obviously to the advantage of all that it be permitted to avail itself of the privilege. That the unit required is so large, or the character of its use confined to so few users that its customers under this rate will be few, should not operate against it, provided it keeps reasonably within the spirit of the law. These contracts should and will be scrutinized with great care, but the public interest does not require, and it is not the policy of the law to effect anything that shall stand in the way of the widest reasonable and just expansion of the business of the public utilities of the state."

The contract rate is approved. The company is ordered to file a class rate for the service in question, making the rate open to other customers, although the Commission states that in all probability no other customers will come in this class, but "the statute evidently presupposes the filing of an open rate similar to that on which the contract is based, so that other applicants for service of the same character may know what they are entitled to."

MISSOURI.

The Annual Report of the Missouri Public Service Commission, covering the period from April 15, 1913, to December 31, 1914, has been issued in bound form.

NEW YORK—Second District.

Nassau Light & Power Company. The petition of F. A. Ludlun and others, asking that the Nassau Light & Power Company be compelled to string its wires on the poles of the Glen Cove Light & Power Company in Dosoris Way, Glen Cove, was dismissed, the Commission holding that it did not have power to make such an order.

The Glen Cove has a line of poles upon which it furnishes electric service to private users, and the Nassau company has a contract for street lighting on Dosoris Way. The Nassau company intends to erect its own poles for furnishing street lighting and is unwilling to string its wires on the poles of the other company. The Commission says: "While the Commission can readily see how much better it would be for the appearance of the street if there were only one line of poles in the Dosoris Way, yet, under the circumstances, it has no power to compel the Nassau company to abandon any of the rights which it claims under its existing franchise, nor has it any right, so far as the record in this case is concerned, to compel the Nassau company to put its wires on the poles of the Glen Cove company in Dosoris Way."

OHIO.

The Northwestern Ohio Light Company. The consolidation of the five electric plants of Urban, Van Wert, Delphos, Deshler and Leipsic into an $800,000 combine has been authorized by the Commission. The Northwestern Ohio Light Company was authorized to issue $400,000 common stock and $400,000 five-per-cent bonds, the proceeds to be used in the purchase of the properties to be consolidated.

WASHINGTON.

Deposits for Telephone Service. The Commission has issued an order requiring that the practice of certain telephone companies in the state of requiring a $5 deposit before service is installed, be discontinued. According to the terms of the order, however, the company may exact two months' rental in advance at the time of ordering service, if the charge does not exceed $5. Should the charge exceed $5 the patrons are to pay month to month in advance, and if it does not exceed $5 the portion not absorbed in the first month's rental is to be applied on the succeeding month's rental, the patron thereafter to pay from month to month in advance.

Not only are cash deposits eliminated, but the order also specifies that no other security for installation can be required by the companies.

The order gives the companies the right to disconnect any telephone, private exchange, or other instrumentality of any subscriber and discontinue the subscriber's service on or after the expiration of ten days from the date on which any account for local exchange service or long-distance service becomes due and payable, in advance or otherwise, when such account remains unpaid after the expiration of ten days from that date.

Water-Power Conference to be Held at Portland.

A conference to discuss water-power development has been called to meet at Portland, Ore., September 21, 22 and 23. The delegates will comprise Federal and State Government officials, utility experts, leaders in water-power development, particularly in the West, and others interested in the subject.

Governor Withycombe, of Oregon, chairman of the delegation from that state, has announced the following tentative program of speakers and addresses:

J. C. Ralston, of Spokane, Wash., "Water Power and Its Relation to National Development." Samuel H. Piles, Seattle, Wash., "State Ownership of Water." Reed Smoot, Provo, Utah, "Federal Tax on Water Powers." John D. Works, Los Angeles, Cal.; George E. Chamberlain, Portland, Ore.; John H. Roemer, Chicago, Ill.; Frank H. Short, Fresno, Cal., "The Constitutional Aspects of the Ferris Bill." William E. Borah, Boise, Idaho; Wesley O. Jones, North Yakima, Wash.; Oscar W. Underwood, Birmingham, Ala.; Henry D. Pierce, Seattle, Wash.; David F. Houston, Secretary of Agriculture; Franklin K. Lane, Secretary of the Interior; Lindley M. Garrison, Secretary of War, "Navigable-Stream Water-Power Legislation."

The final program will be comprehensive, covering the various aspects of the subject. It is expected that about one and one-half days will be devoted to the presentation of addresses and papers, leaving the remaining time for general discussion of the subject.

The mule tramway of Maracaibo, Venezuela, is to be changed to electric power, but it has not yet been decided whether the trolley or the storage-battery system will be employed. A storage-battery tram is being tested out at present.

New Electrical and Mechanical Appliances

Security Lamp Guards.

A novelty in design and construction is shown in the "Security" lamp guards manufactured by the Flexible Steel Lacing Company, Chicago, Ill. The guard is formed of two shells of expanded steel, hinging together at their base. It obstructs the light to a minimum extent and combines light weight with strength. In addition to guarding against breakage, a special

New Simplex Guard.

key-locking device efficiently prevents tampering with, or theft of the lamp. Dealers will be interested to know that it is packed nested, a dozen guards to the carton, and consequently occupies a minimum space for shipping or in the store room.

Parabolic Asbestos Reflector.

A new type of light-weight and relatively low-cost reflector has been placed on the market by the Asbesto-Glean Manufacturing Company, 846

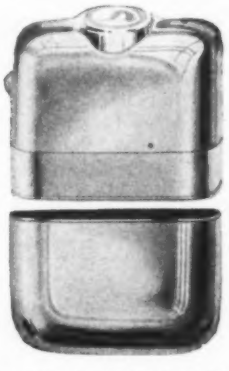
Asbestos Reflector.

South Canal Street, Chicago. This reflector is made of compressed asbestos composition and is similar to the conical reflectors made by this company, which were described in our issue of April 3, 1915. The new reflector, however, is made seamless and has its inner surface corrugated or furrowed so as to eliminate the reflection of bright filament lines on the work. The interior is given a high-grade aluminum finish which is easily cleaned and kept bright. The outer surface has a rich green smooth enamel finish.

These reflectors fit all of the standard brass-shell sockets and are equipped with the Grip-Lock contractile shade-holder by means of which with a simple quarter turn of the grip the reflector can be attached or detached from the socket. The weight of this reflector complete is slightly less than four ounces.

New Kwik-Lite Flashlights.

Electrical dealers will be interested in the 32-page catalog just issued by the Usona Manufacturing Company, 1 Hudson Street, New York City, and 306 South St. Clair Street, Toledo, O. This handsome book fully illustrates and describes the company's Kwik-Lite products, and also gives much valuable flashlight information of general interest. The Kwik-Lite line is complete,



New Vest-Pocket Kwik-Lite.

covering every flashlight requirement, including cases, batteries and lamps. A large variety of new types of cases and battery lanterns are offered, all of which are intensely practical and of exceptional beauty in design and finish.

The new telescope vest-pocket case illustrated herewith is unusually neat and attractive. It consists of two parts drawn from solid sheet brass, and constructed so as to telescope at the center. When pushed together they firmly lock; with a slight pressure on the sides they can be pulled apart and the battery easily inserted. There is not a hinge or a clasp on the entire case.

Another device of much merit is the telescope metal tubular case. It is absolutely non-short-circuiting, and is very strongly made of tubular brass. The lower piece telescopes the upper near the center, this insures maximum strength and permits engaging the screw threads without effort. The lens is secured by a separate screw end ring, which allows a broken lens to be replaced without procuring an entire new head.

All metal Kwik-Lite sets are furnished in a variety of finishes not heretofore obtainable, and provide for a very attractive display and a large sale because they meet the demand of the public for serviceable flashlights of a specially beautiful appearance.

The Kwik-Lite line also includes several very practical types of battery lanterns, fiber tubulars, watch-chain lights, headlights for bicycles and boats and a number of specialties and flashlight novelties, such as gold and ivory tubulars, gold and silver-plated vest-pocket flashlights, pistol lights, etc.

The Kwik-Lite batteries are made for all cases and guaranteed as to life and service. These cases are equipped

Telescoping Tubular Kwik-Lite.

with Mazda lamps, selected with reference to the reflectors in which they are used.

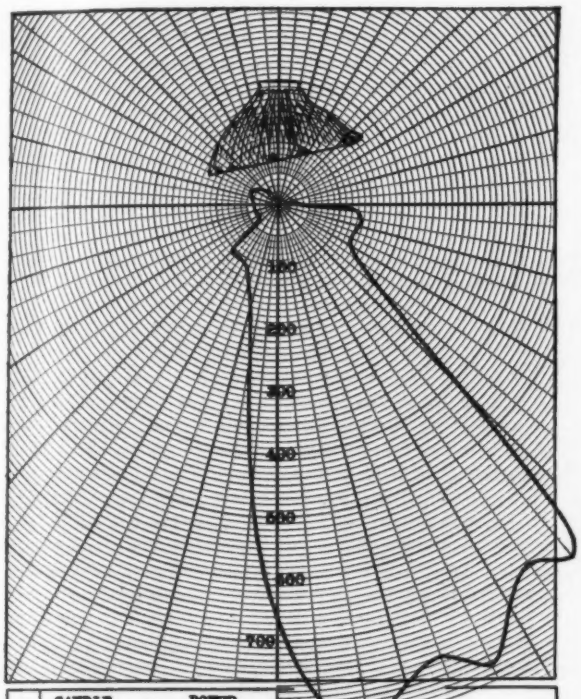
New Prismatic-Glass Window Reflector.

As a result of the agitation to improve the methods of lighting show windows there has resulted an assortment of equipment by means of which this class of lighting can be effectively and efficiently provided. In this line there has recently been placed on the market a new type of prismatic-glass window reflector known as Holophane No. 983. This has the shape shown in Fig. 1, and is designed to be placed at the front upper edge of the window behind the screen usually found in the upper portion of show windows. This reflector is designed particularly for use with the new 100-watt Mazda type C or gas-filled lamps, and usually is mounted in the pendent position shown,

being held by a form H shade-holder. The reflector is provided with prismatic ribs on both inside and outside. These are smooth and do not readily catch dust or dirt. However, they can be easily dusted and cleaned as regular cleaning of the lamp itself is necessary.

The shape of this reflector is such that it throws practically all of the light downward and against the back of the window, giving the distribution curve shown in Fig. 2. This distribution is peculiarly suitable for show-window purposes because the maximum illumination is in the zone lying between the vertical and about 40 degrees from the vertical, that is, just where the window display is located. Thus it produces a most effective illumination of the goods displayed without permitting the lamp or reflector to be seen. A small amount of light is permitted to fall upon the upper front portion of the window, which is usually translucent and contains the name of the firm or something relating to the products sold in the store.

Fig. 1.—New Holophane Show-Window Reflector.



ANGLE	CANDLE POWER To Left	To Right	ANGLE	CANDLE POWER To Left	To Right
0	661	661	65	37.2	129
5	461	797	75	39.7	136
10	251	839	85	38.8	128
15	170	797	90	37.4	36.0
20	134	770	95	40.5	29.8
25	116	816	105	44.0	22.2
30	---	747	115	46.1	
35	105	704	125	42.1	
40	---	738	135	33.4	
45	104	409	145	22.6	
50	---	217			
55	33.6	154			

HOLOPHANE ANGLE REFLECTOR
No.983
With 100-watt Mazda C Lamp
at 1.80 W.P.C.
Form H Holder position
Average of Tests on Four different samples.
8-2-15

Fig. 2.—Distribution Curve of New Reflector.

In Fig. 3 is shown a convenient chart to aid in determining the type of Holophane prismatic reflector to use for show-window lighting The chart is practically self-explanatory. For windows that are very high compared to their depth, reflector No. 8300 is recommended. For medium - shaped windows the new No. 983 is to be used pendent. For windows that are relatively deep in comparison to their height the latter reflector is tipped upward about 15 degrees. The manufacturer recommends that in determining the size and number of lamps to use, 5 to 15 watts per square foot of window floor area should be allowed, depending upon the nature of the goods to be displayed. The reflectors should not be placed far apart along the upper edge of the window, as too large a spacing produces a lack of uniformity of illumination.

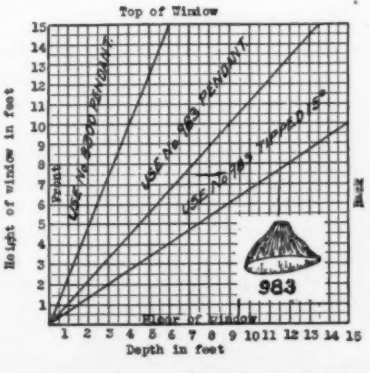
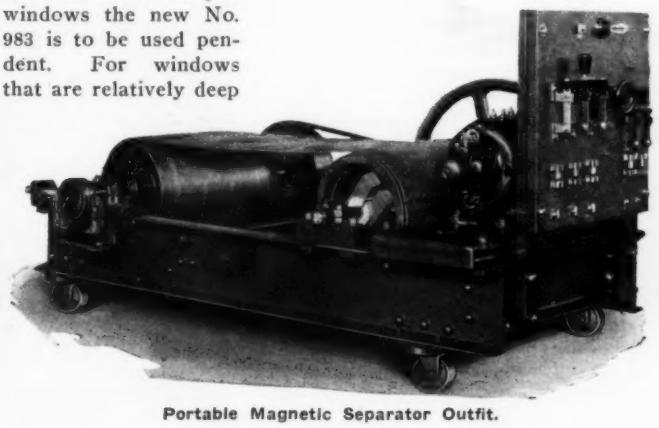


Fig. 3.—Guide Chart for Reflector Selection.

These reflectors are made by the Holophane Works of General Electric Company, Cleveland, O.

New Portable Magnetic Separator Outfit.

The accompanying illustration shows an interesting portable magnetic separating outfit built for the Graphite Lubrication Company, Boundbrook, N. J., by the Cutler-Hammer Clutch Company, Milwaukee, Wis. The separator is used for removing magnetic content from brass in various parts of the plant. The outfit is moved to where a separation is to be made and the material conveyed onto the belt.



Portable Magnetic Separator Outfit.

The brass is projected beyond the pulley freed from magnetic pieces, since the latter hug the belt in passing over the magnetized pulley and are dropped below where the belt leaves the pulley.

The direct current for the magnetic pulley is furnished by the small 110-volt generator which is driven by the same induction motor that drives the pulley. The small panel mounted at one end of the frame carries the three-pole motor knife switch and fuses, the double-pole generator knife switch and fuses, back-of-board type dynamo-field regulator and pilot lamp.

Simple Means for Cleaning Illuminating Glassware.

Smooth glass shades and reflectors, even of the prismatic type, can be easily cleaned of dust and dirt by means of a stiff hair-brush, without removing the glassware from the fixture. When it is desired to more thoroughly clean the glassware, as well as make it sparkle like new, it should be dipped several times in a bucket of water containing one ounce of nitric acid to each gallon of water; no brush or cloth need be used in this case as a rule.

Electric Air Warmers.

The approach of cool weather is directing attention to the subject of convenient electrical means for warming rooms. To the variety of these equipments now available there has been added recently a new line of electric portable and fireplace heaters, which is made by the Majestic Electric Development Company, 428 O'Farrell Street, San Francisco, Cal. A complete assortment of these is on display in the Manufacturers Building at the Panama-Pacific International Exposition.

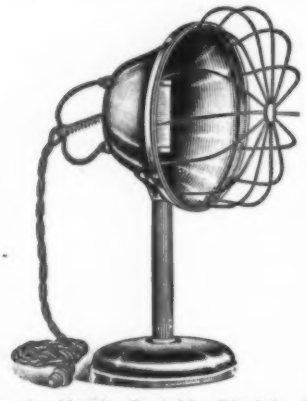


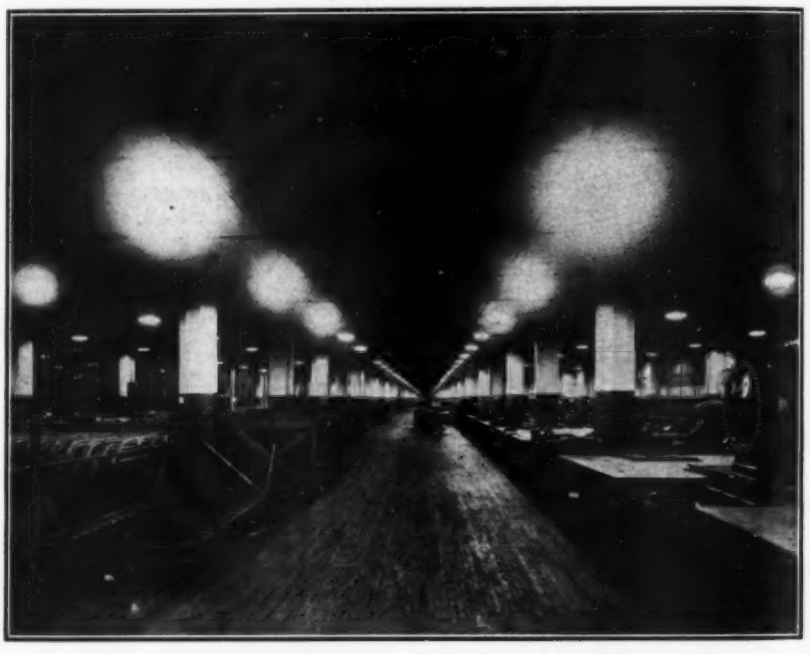
Fig. 1.—Handy Portable Electric Air Warmer.

These Majestic heaters are all of unique construction, with one or more heating units. The one shown in Fig. 1 resembles an enlarged desk telephone stand, and has one heating unit consuming 615 watts. It is made of brass, highly nickeled. The height of the outfit is 16 inches, and the base is 6.5 inches in diameter. The weight is about five pounds, making this a very handy device that can be readily placed where desired. The reflector behind the heating unit directs the heat to the point where it is needed.

Fig. 2.—Portable Electric Heater.

The heater shown in Fig. 2 is of somewhat larger size, and has two units taking 960 watts total. It is finished with the body either in black or white enamel, and the dome and reflector nickel-plated. The guard in front protects from contact with the heating units. This set is mounted on a neat base and provided with a handle, by means of which it can be moved about. Its height is 28 inches and weight about 13 pounds.

In both these units, as well as in others of the Majestic line, the heating units have a very cheerful glow while in operation. Some of these sets are arranged for being mounted in a fireplace similar to the gas logs that have come into more or less use. However, they are vastly superior to any gas-burning device, because they do not vitiate the air with products of combustion, nor deplete the amount of oxygen in the air. Their current consumption is moderate and cost of operation low where reasonably low rates for heating current are in vogue.



Illumination of Trimming Department, Dodge Brothers Motor Car Company.

Noteworthy Reflector Installation.

During recent years lighting interests have emphasized the need of efficient and thorough lighting of industrial establishments in order to reduce accidents and to increase the quantity and quality of production during the dark hours of the day. As a result most of the modern large shops are already or are being equipped with high-efficiency lighting equipment.

A noteworthy installation of this type is that of the recently completed part of the new automobile factory of the Dodge Brothers Motor Car Company, Detroit, Mich. This establishment when completed in full will be one of the largest in the country. In the illustration herewith is shown one floor of the automobile trimming department. The length of the room shown is 1,066 feet; the width of the room is 67 feet. For the illumination of this large area there are provided about 450 Mazda vacuum tungsten lamps of 150 watts each, making an energy consumption per square foot 0.96 watt. Each lamp is surmounted by an enameled steel reflector of the distributing type, known as Benjamin No. 5425. These reflectors are entirely white both inside and outside. The mounting height of the lamps is 10 feet 11 inches above the floor. The lamps are placed 12 feet apart in one direction and 14 feet in the other. Although no illumination values have as yet been obtained, it is evident that illumination is high in intensity as well as very uniform in distribution. This can be noticed from the view of the aisle in the center of the picture. There is a substantial complete absence of shadows throughout the large room.

The entire plant of the Dodge Brothers Company will be similarly equipped, requiring a total of 4,500 reflectors before the first large section of the plant is complete. These reflectors were furnished by the Benjamin Electric Manufacturing Company, 128 South Sangamon Street, Chicago, Ill.

New White Washing Machine.

The White Lily Manufacturing Company, of Davenport, Iowa, is just placing on the market a washing machine known as White's de Luxe, Jr. The

The White de Luxe, Junior, Electric Washer With Bench.

manufacturers claim that this machine will make a marked impression in the washing-machine business, principally on account of the fact that it is a cylinder machine that costs very little more than the ordinary tub machine, and that it is the only cylinder machine on the market with a bench attached. Sam. T. White, the well known president of the White Lily Manufacturing Company, is the inventor of this machine. He has devoted a lifetime to the development of washing machines, and as this is his pet machine, the company naturally feels that its success is assured.

Like all other machines of the power type built by this company they can either be operated by electric motor, gasoline engine, or any other power. The two illustrations given herewith show one driven by electricity and the other fitted with flat-faced pulley, to be driven by any power. The machines are identical in construction, the only difference being in the name and the pulley.

The inventor has satisfied himself, after a very exhaustive study of the washing-machine business, that the cylinder type of machine is the best washing machine. As a proof of this he cites the fact that laundries are a commercial proposition, and to make them pay as a commercial proposition they must use a machine that will take out the dirt in the shortest space of time; now every commercial laundry today is using a cylinder type of machine, with the exception of the laundries known as hand laundries, and a majority of these are using White's de Luxe machines. The laundry washes in two or three minutes what it would take 10 to 15 minutes to wash in the home, but when it is washed in the home it is washed in pure soap and water, and the clothes are washed separately, instead of having them mixed in with every one's, as is done in the ordinary laundry. There is no question, therefore, but what the cylinder machine will take the dirt out under the same conditions with soap and water much quicker than any other type of machine, and at the same time with less wear and tear on the clothes, and one can wash the finest fabrics.

It is said that the new machine can be bought at a lower price than any other cylinder machine of anywhere near the same capacity. This is due to particularly favorable manufacturing facilities. The revolving bench is also one of the features of this machine, and is the invention of Howard Power, secretary of the White Lily Company, and also a deep student of the washing-machine industry. The advantages to be gained from this revolving bench are numerous. It is claimed to be really less work to do a washing with a revolving bench attached to the machine than in any other manner. The operator sets her tubs on the bench. By a hose connection she can run the water from the faucet into the tubs. One of the tubs can be used for bluing water and one for rinsing water. After washing one tub full of clothes, the clothes can be wrung out into the rinsing water, which would be nearest the machine. Then the machine is filled up for a second washing, started to operating, and the lid closed which makes a perfectly clean table. Then without having to move a wringer or step around anywhere the operator can reverse the wringer and wring the clothes out of the rinsing water right onto the table or lid of the machine. When the clothes have all been wrung out the bench can be swung around, since it is on roller bearings, and this can be done with one finger, and the bluing tub brought to where the rinsing tub was. The operator takes the clothes piece by piece without any water in them, spreads them apart properly and puts them into the bluing water as they should be put in to avoid streaking. When they are properly blued they are wrung back onto the table and are then ready to hang on the line. The operator does not have to move from her standing position to do the entire washing.

When the machine is not in use the bench can be folded up, as shown in one of the illustrations, and it takes up very little more room than an ordinary hand machine.

Power-Driven Washer With Bench in Use.

Service Switch Arranged for Disconnection of Fuses Before Handling.

The accompanying illustrations show a type of fused switch in which the fuses cannot be touched except when entirely disconnected from the circuit, as suggested under the proposed Electrical Safety Code of the United States Bureau of Standards.

The advantage in the use of a device of this general character is that the operator cannot come in contact with current-carrying parts when replacing a blown fuse, and it is claimed for the particular device described and illustrated herewith that while the switch and cutout are readily accessible no current-carrying parts are made accessible by opening the switch either for the purpose of interrupting the circuit or exposing the fuses for inspection.

Referring to the illustrations, in

Fig. 1.—Fused Switch in Closed Position.

which one side of the box has been cut away to show the arrangement of the switch and cutout, and particularly to Fig. 2, in which the various parts of the device are lettered for identification, it will be seen that the cover of the box is hinged at its middle point, *H*, the upper portion of the cover swinging out of and the lower part into the box. The flange, *I*, on the cover projects a sufficient distance into the box to keep it effectively closed during the opening motion until the moving contact *A* has broken connection with the fixed live contact *C*.

The porcelain base *B* (which is shown cut away to expose *A* and *C*), swings in close relation with the service-contact base *D*, the baffle plate *F* and the bottom of the box, effectively blocking all access to the service terminal block *D* of the switch on which the service contacts *C* are mounted.

The box is provided with six conduit holes and interchangeable knockout buttons, *G*, the arrangement being such that a conduit hole is available from any direction to any direction.

The cover of the terminal chamber and the upper front cover are arranged for sealing and may be readily removed to facilitate wiring. These seals, however, do not in any way hamper the normal operation of the switch, which is intended for use as a service switch, or for other industrial applications.

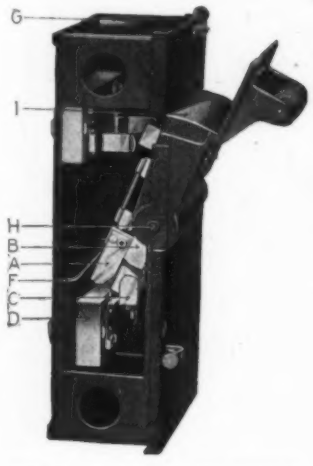


Fig. 2.—Switch Partly Opened.

The device is manufactured by the Palmer Electric & Manufacturing Company, Boston, Mass.

"Home Electrical" Awarded Two Gold Medals.

The "Home Electrical," an exhibit of the General Electric Company in the Palace of Manufactures at the Panama-Pacific International Exposition, described in the issue of June 5, has

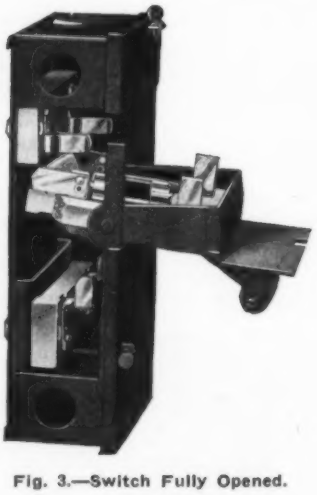


Fig. 3.—Switch Fully Opened.

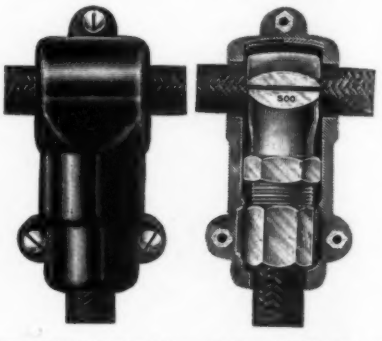
received the unique distinction of being awarded two gold medals by the International Jury of Awards.

This is but one of the exhibits of the company at the Exposition and consists of a full-sized, model home of simple, Spanish-California, bungalow design, in which electricity is made to perform practically all the domestic tasks and labors and to conduce to many of the household comforts of

One of the gold medals was awarded the "Home Electrical" by the Department of Manufactures for the completeness of the exhibit and as an Exposition attraction. The second gold medal was awarded by the Department of Education in recognition of the high educational value of the exhibit.

Insulating Cover for Dossert Cable Taps.

The accompanying illustrations show a new type of insulating cover for branch connections when made with Dossert cable taps. As shown, the covers are in two parts which, when joined together, are held by threaded bolts acting upon metal inserts in the insulating material. The facility with which connector and cover can be connected or disconnected is noteworthy. These devices are being largely installed in industrial plants at points where taps for motors are taken off the main feeders, and on switchboards where taps are taken off the



Top and Interior View of Tap With Cover.

busbars. The insulation possesses good mechanical strength and will not expand, contract or deteriorate in service. Tests have established its safety up to a maximum of 28,000 volts.

These connectors and insulating covers are manufactured by Dossert & Company, 242 West Forty-first Street, New York City.

Tennis Court Lighting With Bryan-Marsh Lamps.

In the issue of August 21, page 320, there was published a description of the successful lighting installation for a public tennis court at Central Park, Louisville, Ky. In publishing this description and the illustrations which accompanied it, mention of the fact that the four 1,000-watt type C Mazda lamps which supplied the illumination were furnished by the Bryan-Marsh Division of the National Lamp Works through the H. C. Taefel Company, of Louisville, who handled the installation, was overlooked.

Current Electrical News

ATLANTIC STATES.

CAPE MAY, N. J.—On Tuesday, September 7, the city will vote upon the question of building a municipal electric lighting plant.

FREEMANSBURG, PA.—Construction work will be started shortly for the entire rebuilding of the Shimer foundry near here, destroyed by fire some time ago. The plans call for one large structure of brick and steel. The entire plant will be motor operated with current furnished by the Lehigh Valley Light and Power Company. M. J. Shimer and Stanley Shimer comprise the firm.

AYDEN, N. C.—Bonds amounting to $50,000 have been voted for electric light, sewers and water works improvements. Address mayor.

HICKORY, N. C.—The Council offers a 30-year electric franchise for sale. Address S. C. Cornwell, city manager.

BACONTON, GA.—The amount of $5,000 will be expended for establishing an electric light plant. Address J. B. Miller, mayor.

COOLIDGE, GA.—Bonds to the amount of $15,000 for improving light plant have been voted. Address mayor.

OCALA, FLA.—The Council has accepted specifications for establishing an electric light plant. Address mayor.

NORTH CENTRAL STATES.

BELLEFONTAINE, O.—The Council is considering a report covering an ornamental lighting sytem of 49 iron posts, with underground conduits, etc., at an estimated cost of $6,237. L.

BREWSTER, O.—Bids will be received until September 9, for the construction of a municipal lighting plant, to cost about $21,000. Bids were opened recently for the same work, but none of the 15 received came within the limit fixed. L.

CINCINNATI, O.—The electrical work involved in the remodeling of the Lincoln and Washburn public schools, and in the construction of a new manual training building, will be bid on until September 13, and that on the new East Side High School until September 20. Plans and specifications can be had of the clerk of the Board of Education, City Hall, or of C. W. Handman, business manager, 511 West Court Street, to whom requests for information should be addressed. L.

CINCINNATI, O.—Part of the mechanical equipment of the new Hamilton County courthouse, the contract for which has been let to the Standard Engineering Company, at $203,855, will consist of a complete lighting plant, with a considerable amount of other electrical work. The company's office is in Washington, D. C. L.

CINCINNATI, O.—The York Ice Machine Company, of York, Pa., has been commissioned by local men interested in a new 50-ton ice plant, to be controlled by independent dealers, to prepare plans and specifications for that purpose. The plant will be constructed on Jefferson Avenue. L.

HAMILTON, O.—The conversion of the present dam at Woodsdale, near here, owned by the Chatfield & Woods Company, of Cincinnati, into the site for a large electric plant, is proposed by interests which are forming a company for that purpose, with the backing of New York interests. Surveys have been made which demonstrate that there is ample water for the purpose of generating power at all seasons. L.

LONDON, O.—Several thousand dollars will be spent by the city on ornamental street lighting in the business section, according to resolutions adopted by the Council declaring the improvement necessary. L.

SPRINGFIELD, O.—Steps are being taken by the city toward the construction of an ornamental street-lighting system, to be paid for partly by property-owners on the streets improved. Work will begin early in the fall. L.

SOUTH BEND, IND.—Members of the Board of Works will meet with the lighting committee of the Chamber of Commerce to discuss further the proposition of installing cluster lights in the down-town section and removing the arc lights. Address city clerk.

GIBSON, ILL.—The Gibson Commercial Club is interested in the matter of establishing an ornamental lighting system. Address President Arrowsmith, of the Gibson Commercial Club.

LORAINE, ILL.—A franchise has been granted to Bert Van Blair for the erection of a light and power plant. Work will begin on the plant at once.

MT. PLEASANT, MICH.—The City Council is looking into the matter of owning and operating its own lighting plant. Address city clerk.

DURAND, WIS.—The Durand Light and Power Company has increased its capital stock from $35,000 to $70,000.

KENOSHA, WIS.—The municipal water plant has been sold to the Simmons Manufacturing Company. Work is to be started immediately on the erection of a modern plant which will cost about $250,000.

ST. CLOUD, MINN.—The Public Service Company, recently reincorporated and bonded for $4,000,000, will start work at once on improvements and extensions to cost half a million. It includes the construction of a new power house on the east end of the St. Cloud dam, the building of a dam and power house at Sauk Rapids, Minn., the extension of transmission lines into all of the territory within 60 miles of St. Cloud, the extension of the gas mains to East St. Cloud and Sauk Rapids, and the extension of the street car lines in the city of St. Cloud. The corporation already has two hydroelectric plants on the west end of the St. Cloud dam. The new one will have a capacity of 4,000 horsepower and will cost $200,000. The Sauk Rapids plant will cost $700,000. Extension of the transmission lines is already under way. The company, of which A. G. Whitney is president, now has wires running to Sauk Rapids, Waite Park, Rockville, Cold Springs, Richmond and St. Joseph. Lines are being run and lights will be operated within 90 days in Roscoe, Paynesville, Eden Valley, Watkins, Kimball, Annandale, Maple Lake, Buffalo, Dassel, Cokato, Howard Lake, and Waverly, combining a population of about 30,000. The first transmission lines were built in 1913.

MARATHON, IOWA.—An election will be held some time in September to vote on a bond issue of $12,000, for a municipal lighting plant. Address town clerk.

WALL LAKE, IOWA.—Bonds amounting to $7,500 have been voted to pay for the construction of a transmission line from Lake View, and the installation of the necessary distributing plant in this city. Also, the purchase of the current from Sac City Electric Company. Address city clerk.

DRAYTON, N. D.—A company of business men has been organized for the purpose of installing an electric light plant. Address the village clerk.

TOWNER, N. D.—C. S. Rygh, of Alexandria, Minn., has been granted a franchise for establishing an electric light plant. The specifications include 60-watt lights and four 5-cluster lamps.

BARNSTON, NEBR.—A hydroelectric power plant will be installed to supply electricity to towns along Blue River. Address George H. Steinmeyer, promoter.

MAGNET, NEBR.—P. J. Sandberg is planning to purchase supplies and material for an electric light and water plant.

SOUTH CENTRAL STATES.

LOUISVILLE, KY.—The long-distance power transmission line being built by the Consolidation Coal Company has been completed from Jenkins, Ky., via Wayland and Allen, to Prestonburg, Floyd County, Ky. A number of the towns in the Big Sandy Valley will receive service from this line, designed primarily to supply mining operations.

COLUMBIA, TENN.—Ways and means are under consideration for a new white way. Address President Sloan, of the board of trade.

PASS CHRISTIAN, MISS.—Bonds for a municipal electric light plant and water works system were indorsed by a committee of citizens at the meeting of the Pass Christian Council. Address mayor.

WHITE CASTLE, LA.—The sum of $25,000 will be expended for a light and water system. Address mayor.

TONKAWA, OKLA.—The city is planning to purchase and install a 20-ampere three-phase, 2,300-volt, 60-cycle generator for an electric light plant; also, to change present arc-lamp street lighting system to incandescent lamps. Address V. K. Stanley, superintendent.

DENISON, TEX.—The Texas Power and Light Company has purchased a site on Red River, near Denison, on which to build a power plant to cost approximately $750,000.

HIGHLAND PARK, TEX.—An issue of $10,000 of bonds has been voted here, the proceeds to be used in installing a system of ornamental street lighting. D.

MARBLE FALLS, TEX.—E. M. Turner, of Dallas, has been appointed receiver of the Colorado Power Company, which is constructing a large dam across the Colorado River here as a means of providing power for a large hydroelectric plant that it planned to build. The same interests, headed by C. H. Alexander, of Dallas, own dam and power sites at other points on the Colorado River. Their scheme involved the building of a system of transmission lines and the furnishing of electric current for lighting and power purposes for a big scope of territory. The appointment of a receiver was made by Judge N. T. Stubbs, of Burnet, on application of Mr. Alexander. It is reported that Mr. Turner will carry out the original construction purposes of the company as rapidly as possible. D.

WESTERN STATES.

ROUNDUP, MONT.—The City Council tabled the resolution for the construction of an ornamental lighting system on account of protests. The estimated cost was $10,000.

BLACKFOOT, IDAHO.—The City Council has under consideration the construction of a system of street lights.

RUPERT, IDAHO.—City officials are considering taking over the local electric light plant and making improvements.

SOCORRO, N. M.—The Socorro Light and Power Company has been organized here with a capital stock of $50,000, for the purpose of building an electric light plant. C. T. Brown is interested. D.

PEACH SPRINGS, ARIZ.—The United States Department of Interior has granted permission to Col. Epes Randolph, of Tucson, and associates, to make preliminary surveys of the proposed dams that they plan to build across the Colorado River in the Grand Canyon, near Peach Springs, and the construction of a series of hydroelectric plants which are to have a total capacity of 400,000 horsepower. The first dam and hydroelectric plant will be located in Diamond Canyon, which is a part of the Grand Canyon. It will develop about 50,000 horsepower. J. B. Girand, city engineer of Phoenix, is one of the promoters of the big project. He will have charge of the surveys that are to be made. D.

PHOENIX, ARIZ.—The land owners of Electrical District No. 1 plan to issue $100,000 of bonds for the purpose of constructing converter stations, electrical equipment and about 80 miles of transmission lines so as to reach practically every farm on the district. D.

ORANGE, CAL.—The mayor has appointed E. H. Smith, C. F. Newton and O. E. Gunther a committee to investigate designs for an ornamental lighting system for the business district of the city.

THE DALLES, ORE.—Robert A. Foster was here recently representing the Lewiston (Idaho) Chamber of Commerce. He stated that $400,000 will be raised in Lewiston toward a $500,000 power and canal project on Snake River, if the government will furnish $100,000.

ROSEBURG, ORE.—Petitions are in circulation requesting the Council to proceed, under authority given it by the city charter, to issue bonds and install a light and water system. The Council is authorized to spend $250,000 on the project.

CHINOOK, WASH.—A 50-year franchise to construct, maintain and operate electric transmission lines over certain highways in Pacific County, viz., the Prest Road and the Columbia North Bank Road, has been granted by the commissioners to E. S. Lakeman. Construction must begin in 30 days, and the lines must be ready for operation within six months, according to the terms of the franchise.

COULEE CITY, WASH.—Oscar Elefson has been granted a franchise to install an electric light system in this town.

EVERETT, WASH.—At a special election held in this city on August 24, the City Council was authorized by voters to procure necessary data and information concerning the feasibility of the development and construction of a plant for the generation of electric current from the waters of the Sultan River. According to investigations made, the proposed site will produce 60,000 horsepower. For several years this city has considered the installation of a municipal plant, which would supply current for both light and power for the use of the city. O.

MORTON, WASH.—It is reported the Lewis County Light and Power Company, of Morton, will make extensions to its power lines in this city and vicinity, some of the work to be done in the immediate future and the remainder early next year. The main lines of the company, including telephone wires, are being removed from the business streets to the alleys, at this time. O.

OLYMPIA, WASH.—A franchise has been granted to George Tilden, of Seattle, to run power lines in Thurston County from his proposed plant on the Skokomish River. Lines will be run from Aberdeen to Olympia, and will supply many small communities and farming districts.

SEQUIM, WASH.—Articles of incorporation have been filed with the Secretary of State, Olympia, by the Sequim Light and Power Company, here, naming Joseph Keller and Paul C. Farmer, both of Sequim, as incorporators, and the capital stock at $3,500. It is understood the company will engage in the light and power business in this city.

STANWOOD, WASH.—G. W. Kunze will not purchase the holdings of the Stanwood Light and Power Company, in this city, as heretofore reported. However, it is understood the improvements and extensions planned by Kunze, should he take over the property, will be made by the present owners. The plant is valued at about $15,000, and several thousand dollars, according to reports, will be expended in improving and extending the service. O.

SUMNER, WASH.—A new lighting system will be installed here by the Puget Sound Light and Power Company, as the result of a change in the contract allowed by the City Council.

NEW PUBLICATIONS.

PHILADELPHIA ELECTRICAL BUREAU.—The annual report of the Electrical Bureau of Philadelphia for the year 1914 has been issued by the chief of the Bureau, Clayton W. Pike. This covers the lighting of streets and public buildings, the police telephone and fire-alarm system, operation of the power plant in the City Hall, electrical inspection, etc.

SMITHSONIAN INSTITUTION.—The annual report of the Smithsonian Institution for the year 1914 has been published by the secretary, Charles D. Walcott. Among the papers printed in the appendix is one by Preston S. Millar, which was presented before the Franklin Institute of Pennsylvania, entitled "Recent Developments in the Art of Illumination."

FOREIGN TRADE OPPORTUNITIES.

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its branch offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 18,076. ELECTRIC TRANSMISSION POSTS.—A supply company in Honduras writes an American consular officer that it wishes to receive prices and descriptive catalogs of electric steel transmission posts. The maximum height of the posts should be 30 feet. Weights should be indicated and quotations should be made f. o. b. New York or New Orleans.

NO. 18,083. INCANDESCENT LAMPS.—A firm in Serbia informs an American consular officer that it desires to purchase large quantities of incandescent lamps for ordinary use. Catalogs and full information should be sent, so that orders may be placed by cable. Correspondence should be in German or French.

NO. 18,093. ELECTRIC WIRE.—A buyer of telephone and electric light wire in an insular possession informs an American consular officer that he desires to establish commercial relation with American exporters of galvanized-iron wire 0.07874 inch in diameter for telephone lines; noninsulated hard copper wire for electric lights, 0.23622 inch in diameter. He wishes to receive prices on various kinds of noninsulated copper wires and cables for electric light and power transmission. He states that he had hitherto been given 30 days' credit, but is willing to make payment against shipping documents upon arrival of goods in the foreign port.

NO. 18,100. GLASS BULBS, WIRE, ETC.—A firm of incandescent-lamp manufacturers in Brazil informs an American consular officer that it desires to receive catalogs, prices, and full information from American manufacturers of glass bulbs of various sizes; molybdenum filament; straight and spiral tungsten filaments; copper, nickel, and platinum wire; tin bases for electric lamps; chemicals for ground glass; anhydrous phosphorus; pure "amorpho" phosphorus; modern machinery for the manufacture of electric incandescent lamps, including vacuum pumps, and rubber hose. Correspondence should be in Portuguese.

NO. 18,120. ELECTRICAL SUPPLIES.—A firm in Portugal is anxious to make agency connections with American manufacturers of electrical supplies.

NO. 18,144. CONDUIT AND FITTINGS.—A mechanical engineer in France informs an American consular officer that he desires to be placed in direct communication with American manufacturers of iron and steel pipe and conduit for gas, electric, water, and heating installations, as well as accessories for these systems. He desires to arrange for an exclusive agency. Quotations should be made c. i. f. destination. Samples, catalogs, and descriptive matter should be in French.

FINANCIAL NOTES.

The Union Gas & Electric Company, a subsidiary of Columbia Gas & Electric Company, has substituted $600,000 in cash for bonds of the Columbia Gas & Electric Company in the fund deposited to guarantee dividends on the stock of Cincinnati Gas & Electric Company under the lease of the latter property. The amount of cash provided to be deposited under the guarantee was $3,000,000, but several years Columbia Gas & Electric bonds were substituted for a part of the cash. The fund now comprises $1,000,000 cash and Columbia Gas & Electric bonds at a valuation of $2,000,000.

The board of directors of the Mexican Northern Power Company state that with the proceeds realized from the sale of a part of the $3,000,000 six-per-cent 30-year prior-lien bonds authorized last May and from loans made with the prior-lien bonds as security, the company has been able to make considerable progress on the completion of the company's dam and transmission lines to Parral. It is hoped that the company will be able to deliver power to customers by October 1. The directors state that it is manifest, however, that the company will not be able to meet the interest coupons due January 1, 1916, on the $10,000,000 30-year five-per-cent first-mortgage and default will again take place on that date. A committee has been formed to receive deposits of these bonds and it is hoped that all holders will make such deposits by October 1. These deposits are being asked as a preliminary to arranging a plan of reorganization for the company, the troubles of which came about through the internal difficulties of Mexico.

Dividends.

	Term.	Rate.	Payable.
B'klyn Rapid Tran.....	Q	1.5 %	Oct. 1
Chicago Tel.	—	$2.00	Sept. 30
Colorado Power	Q	1.75%	Sept. 15
Conn. Power pf.....	Q	$1.50	Sept. 1
Mackay Cos. pf.....	Q	1 %	Oct. 1
Mackay Cos. com.....	Q	1.25%	Oct. 1
Montana Power pf.....	Q	1.75%	Oct. 1
Montana Power com...	Q	1 %	Oct. 1
N. Y. Transit.....	—	$4.00	Oct. 15
N. Y. & Queens Elec. Lt. & Pr. pf.....	Q	1 %	Sept. 1

Reports of Earnings.

PACIFIC GAS & ELECTRIC.

	1915	1914
July gross .....$	1,482.707	$ 1,325,579
Net after taxes.....	587.545	504,358
Other income	35.426	24.743
Total income	622.971	529.101
Surplus after charges	353,138	177,374
Balance after bond and note discount and expense	339.595	137,058
Seven months' gross..	10,686,205	9,753 892
Net after taxes.....	4,681,700	4,001.218
Other income	217.297	184,421
Total income	4,898,997	4,185,638
Surplus after charges and discount	2,458,777	1,439,051
Balance after preferred dividends	1,733.132	989.051
Twelve months' gross	17,845.001	16,544.431
Net after taxes.....	7,679,249	6,250.809
Other income	340,692	339.349
Total income	8.019,941	6,590,158
Surplus after charges	3,665,392	2,013,090
Balance after preferred dividends	2,774,764	1,413,090

REPUBLIC RAILWAY & LIGHT.

	1915	1914
July gross .....$	250,908	$ 252,217
Net after taxes.....	107,081	106,050
Surplus after charges..	47,828	48,967
Balance after preferred dividends	21,871	23,010
Seven months' gross...	1,707,827	1,747,950
Net after taxes.....	648,462	673,383
Surplus after charges...	247,373	280,275
Balance after preferred dividends	65,674	98,576

NORTHERN STATES POWER.

July gross .....$	369,903	$ 327,405
Net after taxes.....	191,888	168,304
Seven months' gross...	2,827,560	2,525,303
Net after taxes.....	1,550,510	1,321,246
Twelve months' gross...	4,807,594	.....
Net after taxes.....	2,661,255	.....
Surplus after charges...	1,177,686	.....
Balance after preferred dividends	590,617	.....

PROPOSALS.

FIRING MAGNETOS.—Sealed proposals will be received at the office of the Chief of Ordnance, United States Army, War Department, Washington, D. C., until September 17, for furnishing and delivering f. o. b. contractor's works 353 firing magnetos, type GA. Further particulars may be had on application to the above office.

ELECTRIC MOTOR-DRIVEN HOIST.—Sealed proposals will be received September 10, at room 406 City Hall, Chicago, Ill., for furnishing and delivering at 4850 Wilson Avenue, one double-drum electric motor-driven hoist, according to plans and specifications on file in the office of the Department of Public Works. Address W. R. Moorhouse, Commissioner of Public Works.

ELECTRIC ELEVATOR PLANT.—Sealed proposals will be received by the Supervising Architect, Treasury Department, Washington, D. C., until October 8, 1915, for the installation complete of an electric elevator plant in the United States appraiser's stores at Boston, Mass. Copies of drawings and specifications may be had upon application to James A. Wetmore, Acting Supervising Architect, Washington, D. C.

PERSONAL MENTION.

MR. ABBOTT S. COOKE, president of the Cooke-Wilson Electric Supply Company, Philadelphia, Pa., has been elected a vice-president and member of the council of the National Historical Society.

MR. ROBERT K. SHEPPARD, formerly manager of sales for the insulated-wire department of the B. F. Goodrich Company, Akron, O., is now associated with the Simplex Wire & Cable Company, Boston, Mass., as sales manager.

MR. DENNIS O'NEILL, who has been with Armour & Company, Chicago, Ill., for the past 26 years, has been made chief electrician of that company, taking the place made vacant by the recent death of Mr. James Malia. Mr. O'Neill was born in the County Antrim, Ireland, 53 years ago, and was assistant to Mr. Malia for 25 years. He has had a wide experience in the handling of alternating-current and direct-current motors and motor-driven machinery, and before his employment with Armour & Company was in charge of the plant of E. Rothschild & Company, Chicago.

MR. H. V. JAMISON, advertising manager of the American Sheet and Tin Plate Company, Pittsburgh, Pa., has been awarded a gold medal by the Panama-Pacific International Exposition Society for valuable services rendered in the installation of the large exhibits of the United States Steel Corporation and its subsidiary companies. When the Steel Corporation decided to make an extensive exhibit at San Francisco, Mr. Jamison was appointed Director of Exhibits. The results were so successful that the Steel Corporation and its subsidiaries were accorded the Grand Prize, for the excellence of their exhibits and Mr. Jamison was awarded a gold medal in recognition of his services.

MR. HOWARD A. LOEB, chairman of the executive committee of the Pennsylvania Lighting Company, of Shamokin, Pa., and of the Kentucky Traction Company, of Lexington, Ky., has been elected to the presidency of the Tradesmen's National Bank, of Philadelphia, succeeding his father, the late August B. Loeb. The new president is one of the youngest bank heads in Philadelphia, being only 40 years old. After his graduation from the engineering department of the University of Pennsylvania, he accepted a position with a contracting engineering firm. In 1907 he went to the Tradesmen's National Bank as vice-president.

GENERAL GEORGE H. HARRIES, president of the Louisville Gas and Electric Company, received high honors from the members of the District of Columbia National Guards on the occasion of his recent retirement from the post of commander of that organization. With elaborate ceremonies he was presented with the equipment of his rank, consisting of a Major-General's presentation saber, appropriately inscribed; a full-dress belt, a full-dress sash, a gold belt knot and a pair of silver spurs. Presentation, in the name of the officers of the District's Guards, was made by Brigadier-General Harvey. In his acceptance General Harries advocated a universal volunteer army for the United States, with 30 days of military training each year for every able-bodied male between the ages of 18 and 25. He developed his plan in some detail.

MR. F. J. DERGE, who has been manager of the light, heat and power departments of the Toledo Railways and Light Company, for some time past, has been advanced and will leave Toledo on October 1, to go to New York, where he has accepted a position as chief engineer for the Henry L. Doherty Company. He will take the place vacated by Mr. M. R. Bump, who resigned to become vice-president of the Picher Lead Company, of Joplin, Mo. Mr. Derge will thus hold one of the biggest engineering jobs in the country and will have 100 properties to supervise. He began with the Doherty organization at the bottom of the ladder. The position in Toledo to be vacated by Mr. Derge, will be filled by Mr. R. E. Burger, manager of the Elvria, O., property of the Doherty company. Mr. J. B. Johnson, superintendent of the Elyria

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Aug. 30.	Aug. 23.
American Tel. & Tel. (New York)	123½	121
Commonwealth Edison (Chicago)	135	135
Edison Electric Illuminating (Boston)	232½	230
Electric Storage Battery common (Philadelphia)	63	62¾
Electric Storage Battery preferred (Philadelphia)	63	62¾
General Electric (New York)	175½	168
Kings County Electric (New York)	119	119
Massachusetts Electric common (Boston)	4⅞	4⅝
Massachusetts Electric preferred (Boston)	33	33¾
National Carbon common (Chicago)	140	140
National Carbon preferred (Chicago)	119¾	119¾
New England Telephone (Boston)	130	131
Philadelphia Electric (Philadelphia)	24½	24¼
Postal Telegraph and Cables common (New York)	75	70
Postal Telegraph and Cables preferred (New York)	65½	66¾
Western Union (New York)	72	69⅞
Westinghouse common (New York)	116¼	111⅛
Westinghouse preferred (New York)	135	135

company, will become manager at that place.

MR. BERTRAM SMITH, well known in the storage battery business for the past 15 years, has been appointed manager of the Detroit office of the Edison Storage Battery Company. About a year and a half ago, Mr. Smith joined the Edison interests as assistant manager of the Edison Storage Battery Supply Company of San Francisco, the distributor for the Edison nickel-iron-alkaline battery on the Pacific Coast. Directly previous to his connection with the Edison Company he was manager of the battery department in the Chicago branch of the United States Light and Heating Company. He was formerly secretary and treasurer of the National Battery Company of Buffalo until its consolidation with the United

Bertram Smith.

States Light and Heating Company. In taking up his new duties in Detroit, therefore, he is returning to familiar territory. In order to better serve its customers in eastern Michigan, as well as Ohio and adjoining territory, the Edison Storage Battery Company recently moved its Cleveland office to Detroit, where it has located in the new David Whitney Building on Woodward Avenue. The appointment of Mr. Smith as manager, together with the Company's rapidly growing business in this section, is expected to make the Detroit office one of the most important branches.

OBITUARY.

MR. JOHN R. GRAHAM, one of the foremost men in the electrical industry in New England, died at his summer home, Intervale, N. H., August 24. For the past 13 years Mr. Graham has made his home in Bangor, Me., where he was at the head of the Bangor Railway and Electric Company and a director in the Bar Harbor & Union River Power Company, which operates extensive hydroelectric plants. The deceased began his career in the street railway business while a shoe manufacturer at Quincy, Mass. He reorganized the Quincy Street Railway, which was merged with the Bay State system. He was one of the first Rapid Transit Commissioners of Massachusetts, in 1893. Mr. Graham was a native of the north of Ireland, being born in 1847. He came to America at the age of five years and, with his parents, settled in Boston. When but 17 years of age, he enlisted in the 42nd Massachusetts Infantry, later re-enlisting in the Fourth Cavalry, with which he served until the end of the Civil War. Returning to Massachusetts, he began the manufacture of shoes; which business his sons now conduct. His removal to Bangor was in 1902. He became a large real estate owner and had a large experimental farm near the city. Mr. Graham was twice married. The widow and ten children by the first marriage survive.

DATES AHEAD.

Indiana Electric Light Association. Annual convention, Hotel Deming, Terre Haute, Ind., September 8-10. Secretary, T. Donahue, La Fayette, Ind.

Pennsylvania Electric Association. Annual convention, Bedford Springs, Pa., September 8-10. Secretary, H. N. Mueller, 435 Sixth Avenue, Pittsburgh, Pa.

Association of Iron and Steel Electrical Engineers. Annual convention, Hotel Statler, Detroit, Mich., September 8-11. Secretary, W. T. Snyder, McKeesport, Pa.

Northwest Section, National Electric Light Association. Annual convention, Multnomah Hotel, Portland, Ore., September 8-10. Secretary, N. W. Brockett, Pioneer Building, Seattle Wash.

Association of Edison Illuminating Companies. Annual convention, Spring Lake, N. J., September 13-16. Secretary, George C. Holberton, San Francisco, Cal.

Electrical Supply Jobbers' Association. Quarterly meeting. Clifton Hotel, Niagara Falls, Ont., September 14-16. Secretary, Franklin Overbagh, 411 South Clinton Street, Chicago, Ill.

New England Section, National Electric Light Association. Annual convention, Mt. Kineo House, Kineo, Me., September 14-17. Secretary, O. A. Bursiel, 149 Tremont Street, Boston, Mass.

American Institute of Electrical Engineers. Panama-Pacific convention, Native Sons of the Golden West Building, San Francisco, Cal., September 16-18. Secretary, F. L. Hutchinson, 33 West Thirty-ninth Street, New York, N. Y.

American Electrochemical Society, Twenty-eighth general meeting. Clift Hotel, San Francisco, Cal., September 16-18. Secretary, Joseph W. Richards, South Bethlehem, Pa.

International Engineering Congress, Civic Auditorium, San Francisco, Cal., September 20-25. Executive secretary, E. J. Dupuy, Foxcroft Building, San Francisco, Cal.

American Mining Congress. Eighteenth annual convention, San Francisco, Cal., September 20-22. Secretary, J. F. Callbreath, Munsey Building, Washington, D. C.

Illuminating Engineering Society. Annual convention, New Willard Hotel, Washington, D. C., September 20-23. Assistant secretary, Joseph Langan, 29 West Thirty-ninth Street, New York, N. Y.

Telephone Pioneers of America. Annual meeting, San Francisco, Cal., September 21-23. Secretary, R. H. Starrett, 15 Dey Street, New York, N. Y.

Southeastern Section, National Electric Light Association. Annual convention, Grove Park Inn, Asheville, N. C., September 22-24. Secretary George H. Wygant, Tampa, Fla.

Colorado Electric Light, Power and Railway Association. Thirteenth annual convention, Glenwood Springs, Colo., September 23-25. Secretary, Thomas F. Kennedy, 900 Fifteenth Street, Denver, Colo.

American Electric Railway Association. Annual convention, San Francisco, Cal., October 4-8. Secretary, E. B. Burritt, 8 West Fortieth Street, New York, N. Y.

Empire State Gas and Electric Association. Annual meeting, Engineering Societies Building, New York City, October 7-8. Secretary, C. H. B. Chapin, 29 West Thirty-ninth Street, New York, N. Y.

Jovian Order. Thirteenth annual convention, Hotel Sherman, Chicago, Ill., October 13-15. Mercury, Ell C. Bennett, Syndicate Trust Building, St. Louis, Mo.

Electric Vehicle Association of America. Annual convention, Cleveland, O., October 18-19. Executive secretary, A. J. Marshall, 29 West Thirty-ninth Street, New York, N. Y.

With the Electrical Manufacturers

The Westinghouse Electric and Manufacturing Company, Chicago, Ill., announces the removal of its Chicago offices to the twenty-first floor of the Conway Building, Clark and Washington Streets. These offices are also used by Westinghouse Machine Company and Westinghouse Lamp Company.

H. S. Thomas, engineer, Compania Electrica de Concepcion, Casilla 997, Concepcion, Chile, South America, announces that he will be glad to receive catalogs of electrical material carried by manufacturers in the United States, with a view to opening up business connections.

Steel City Electric Company, 1219 Columbus Avenue, Pittsburgh, Pa., has issued leaflet No. 151 dealing with Steel City outlet boxes and covers. Each of these devices is conveniently listed with a brief description, catalog number and small diagram to show the construction. A very complete line of

boxes and covers is included, also bushings and locknuts.

The R. Thomas & Sons Company, East Liverpool, O., has issued a circular relating to the testing of Thomas insulators. This describes the testing equipment used by the company and the method of conducting routine and standard design tests of all of the product. A number of illustrations show the apparatus and method of testing.

The Marion Insulated Wire and Cable Company, Marion, Ind., has, among other contracts, secured one from The Ford Motor Company, Detroit, covering about 300,000 feet of insulated wire of all dimensions—some of it as large as 300,000 circular mils. This wire is to be used in a large addition to the Ford plant. The Marion company states that it is quite busy and while it has a fairly good stock of wire on hand, the demand for certain sizes has exhausted its stock.

General Bakelite Company, 100 William Street, New York City, has issued a booklet entitled "Oxybenzylmethylenglycolanhydride." This striking name is nothing more than the full chemical name for the interesting condensation product commonly known as Bakelite. The booklet sets forth some of the distinctive properties of this compound, which was originated by Dr. L. H. Baekeland. Illustrations are shown of a variety of products made of this material, of which quite a number are electrical parts.

Edwards & Company, Incorporated, 140th and Exterior Streets, New York City, has issued a series of advertising cards relating to its line of Dixie products. No. 1 and 3 of this series illustrate and point out some of the interesting features of the Dixie bell. No. 2 similarly deals with the Dixie annunciator. No. 4 is an attractive calendar card showing a Dixie belle; the calendar covers the remaining months of this year and all of 1916. Pertinent reference is made to Dixie bells, buzzers and annunciators.

D. & W. Fuse Company, Providence, R. I., has issued a new book on the D. & W. enclosed fuses. This sets forth the advantages and distinctive features of construction of this well known line of cartridge fuses. Particular attention is given to the external appearance and to the various forms of link construction, especially the air-drum link, the multiple link and the cylinder link types. Fuse filling is commented on and the importance of proper attention to this feature is emphasized. The strong mechanical construction of these fuses is pointed out, as well as the accuracy of their fuse rating, which is strictly in accordance with the exacting requirements of the National Board of Fire Underwriters. Some suggestions on the fusing of motors are also given. Then follow tables of the standard D. & W. fuses from 3 to 1,000 amperes.

The Pan Electric Manufacturing Company, St. Louis, Mo., has recently designed and machined complete two commutators for a large Portland cement company in Iowa. These commutators were for two 150-horsepower slow-speed motors and the entire work, including drawings, patterns, etc., was completed within three weeks. The company has on hand an order for twenty 32-volt armatures from the L. B. Jones Company, Kansas City, manufacturer of the Jones system of farm-lighting sets. The generator end of this equipment was designed by I. P. Chandeysson, president and general manager of the Pan Electric Manufacturing Company, in conjunction with L. B. Jones. The company is located in its own building at the northwest corner of Fourth and Gratiot Streets, and was incorporated in 1902. For the past eight years it has specialized in the manufacture of direct-current motors, standard and low-voltage dynamos for farm and suburban plants, moving-picture theaters, etc. It also makes a specialty of electroplating generators and special direct-current apparatus. Besides these lines the original object of the company, the repairing of electrical apparatus, has been continued as a separate department with greatly improved equipment and facilities. The Chandeysson motors, which is the trade name under which the line is marketed, are sold under an absolute guarantee to be free from electrical and mechanical defects for a period of two years from date of sale, and further guaranteed to come within the specifications of the Standardization Committee of the American Institute of Electrical Engineers. Despite the general business depression and the absence of Mr. Chandeysson, who is still a member of the French military service, the company has been running at approximately 75 per cent full capacity.

Record of Electrical Patents

Issued by the United States Patent Office, August 24, 1915.

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,150,872. Signaling Mechanism for Automobiles. S. W. Meredith and T. Walsh, Philadelphia, Pa. Comprises a lamp and electromagnetically operated semaphore.

1,150,894. Lighting Fixture. M. W. Singer, Chicago, and D. Woodhead, Evanston, Ill. Arrangement of binding posts in ceiling plate for indirect or semi-direct fixtures.

1,150,895. Condenser. A. K. Sloan, Brooklyn, N. Y. Plates in the form of concentric, nested cups.

1,150,902. System of Electric Despatch. K. E. Stuart, Philadelphia, Pa. Field and armature of car-propelling motor have separate connections to external circuit and are controlled from fixed point.

1,150,903. Automatic Controller for Flying Machines. W. W. Swan, Frankfort, S. D. Hydrostatic means operated by tilting electromagnetically controls stabilizing mechanism.

1,150,907. Lightning-Rod Terminal. G. E. Thompson, Owatosna, Minn. Structure of ground connection.

1,150,911. Gathering Locomotive. C. J. E. Waxbom, assignor to Jeffrey Mfg. Co., Columbus, O. Gearing, etc., for reel for supply conductor on electric locomotive.

1,150,917. Storage Battery. T. A. Willard, assignor to Willard Storage Battery Co., Cleveland, O. Structure of battery-jar cover.

1,150,918. Connector for Storage Batteries. T. A. Willard, assignor to Willard Storage Battery Co. Special structure of connector adapted for use with above cover.

1,150,919. Storage-Battery Connector. T. A. Willard, assignor to Willard Storage Battery Co. Has tapered socket, for receiving terminal, reinforced by spiral conductor imbedded in connector.

1,150,926. Protective Apparatus for Electric Circuits. W. E. Britton, Muskegon, Mich. Grounded spark-gap device for relieving line when there is abnormally heavy current.

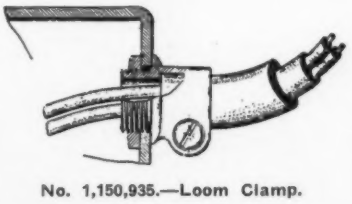
1,150,932. Combined Safety Door and Signaling System for Railway Trains. J. S. Doyle, New York, N. Y. Starting signal to motorman prevented unless car door is closed.

1,150,935. Electric-Wiring Fitting. S. R. Fralick, Chicago, Ill. For bushing flexible conduit into junction box or the like. (See cut.)

1,150,939. Electric Heating System. L. P. Hynes, assignor to Railway Utility Co., Chicago, Ill. Circuit arrangements of thermostatically controlled electric heating for cars, heating circuit being cut out during acceleration.

1,150,945. Fire-Alarm Guard. S. Jarozs, assignor of one-half to A. Grzezinski, Detroit, Mich. Has means for gripping hand of and holding operator upon attempted operation of box.

1,150,953. Selenium-Cell Regulator. M. Moskowitz, assignor to Central Trust Co., New York, N. Y. A lighting system regulated by selenium-controlled resistance, responsive to light conditions of system.



No. 1,150,935.—Loom Clamp.

1,150,968. Electric Sadiron. H. Rosenthal, assignor of one-half to J. J. Baylson, Philadelphia, Pa. Ventilation of, and mounting of resistor in, hollow body portion.

1,150,973. Automatic Current Cutoff for Electrical Appliances. U. S. Smith, assignor of one-half to A. C. Kaufman, Sacramento, Cal. Fuse, on overheating, releases tension device which disconnects plug of flatiron.

1,150,979. Electric Clock. W. H. Thompson, assignor to Thompson Electric Clock Co., Memphis, Tenn. Structure for connecting and disconnecting electromagnetic movement as it is inserted in and withdrawn from casing.

1,151,003. Catalytic Material and Process of Making Same. C. Ellis, Montclair, N. J. For hydrogenating fatty oils; comprises electrolytically deposited nickel supported on a hydrogen-occluding carrier.

1,151,011. Pedestal. W. Hegenscheidt, Chicago, Ill. Special structure of plastic material provided with conduits, etc., for electric portable lamp.

1,151,025, 1,151,026 and 1,151,027. Railway Train Controlling System. J. C. McDonald, New York, N. Y. First patent, sectional conductor system; clear signal permits energizing of section by car. Second and third patents, modifications.

1,151,038. Attachment Plug. C. D. Platt, Bridgeport, Conn. Has plug at one end and socket at other.

1,151,045. Process of Hydrogenating Oils or Fats. W. D. Richardson, assignor to Swift & Co., Chicago, Ill. Comprises mixing oil or fat with electrically disintegrated catalytic metal produced in an inorganic liquid and treating the mixture with hydrogen to produce absorption thereof.

1,151,077. Storage Battery. T. A. Willard, assignor to Willard Storage Battery Co. Venting means in battery cover.

1,151,098. Radiotelegraphic Plant. E. Girardeau, assignor of one-half to J. Bethenod, Paris, France. Receiver has a number of induction jiggers, one or more of which are switched in according to the waves received.

1,151,114. Flashlight. G. Matthies and A. Rehberg, Jr., San Antonio, Texas. Tubular, pocket type arranged in handle of umbrella or the like.

1,151,118. Apparatus for Checking Electro-Cardiographs, Oscillographs, and the Like. G. Mylo, assignor to Siemens & Halske A. G., Berlin, Germany. Reflecting galvanometer, having adjustable oscillatory system with means for visually indicating movements of the system, is alternately connected with circuit to be tested and local circuit of known wave form.

1,151,129. Electrical Gas Lamp and Method of Producing Light by Means of

the Same. F. Skaupy, assignor to Deutsche Gasglühlicht Aktiengesellschaft, Berlin, Germany. Gas lamp operated by arc-like discharges has cathode of alkali metal, a light tube containing a rare gas capable of acting as a conductor adjacent the cathode and means for preventing metal vapors from entering the tube.

1,151,135. Fuse Cartridge. E. Stranszky, New York, N. Y. Has central rotatable fuse carrier carrying a number of fuses which may be brought successively into operation by rotating the carrier.

1,151,142. Thermo Circuit-Closer. L. L. White, assignor to Platinum Electric Incubator Co., Dorris, Cal. Thermostat in casing adjustable from exterior thereof.

1,151,149. Alarm Lock. J. A. Alfred, Jeffersonville, Ind. Catch holding door open may be released by electromagnet and push-button and latch holding door closed sounds bell when operated.

1,151,162. Electric Switch. C. Carson, New Rochelle, N. Y. Particular structure of switch for mounting at top of casing inclosing dry cell and carrying lamp.

1,151,179. Insulator. E. D. Harris, assignor of one-half to A. A. Mueller, Sycamore, Ill. Has groove opening at side to receive wire and axial bore to give access to wire to press it back of retaining shoulder.

1,151,185. Electrical Apparatus. F. C. Jamieson, Cleveland, O. Valve members of nitrous oxide apparatus are electrically heated to prevent freezing of the expanding gas.

1,151,189. Electrically Heated Cooker. A. J. Kercher, assignor to Berkeley Electric Cooker Co., Berkeley, Cal. Heat-insulated structure having cooking chamber heated by electrically heated steam and water jacket thermostatically controlled.

1,151,194. Device for Signaling to and Automatically Stopping Running Trains. O. Kropp, West Hoboken, N. J. Display of different colored lights in cab of locomotive electromagnetically controlled by device mounted on track.

1,151,195. Signaling and Train-Stopping Device. O. Kropp. Structure of track device for above.

1,151,201. Flashlight. L. B. Lincoln, Chicago, Ill. Arrangement of contacts and switch in tubular battery pocket lamp.

1,151,203. Drying or Roasting Apparatus or the Like. H. Löfquist, Stockholm, Sweden. Electric resistors in agitators on inner surface of electrically rotated drum containing material to be roasted.

1,151,214. Combined Attachment Plug and Base. M. Norden, assignor to J. Norden, New York, N. Y. Plug secured in base by right-angled contacts overlapping base and which make and break contact by rotating plug in base.

1,151,215. Torsional-Grip Cable Hanger. J. E. Ogden, Brooklyn, N. Y. Single strip of wire for suspending cable from messenger has specially formed ends to engage the messenger with a torsional-grip helix.

1,151,216. Selective Electrical Signaling Apparatus. L. M. Potts, assignor to A. McLanahan, Baltimore, Md. Device for transmitting to line a succession of impulses of different character has successively operated switches for controlling order of impulses, a time element controlling switches for determining duration of impulses and means for automatically stopping operation of time element at end of each signal period.

1,151,219. Electric Bulb Holder. H. Scherer, Billings, Mont. Spring wire device engages socket and bulb tip to hold lamp in socket.

1,151,241. Magnetic Short-Circuiting Switch. L. Bradley and H. L. Bradley, Milwaukee, Wis. Electromagnetic means controlled by voltage conditions for controlling compression resistance and its connection with circuit for automatic motor operation.

1,151,249. Electric Lamp. H. A. Douglas, Bronson, Mich. Lamp can be adjusted along focal axis of reflector by turning it, good connection being maintained.

1,151,264. Automobile Alarm. R. C. Groh, assignor to T. P. McKay, P. Gottfried and O. O. Rindal, St. Paul, Minn. Alarm circuit is connected with main circuit of automobile by key-operated plunger.

1,151,267. Apparatus for Sterilizing Liquids by Means of Ultra-Violet Rays. V. Henri, A. Helbronner and M. von Recklinghausen, assignors to R. U. V. Co., New York, N. Y. Liquid is continually agitated while subjected to sterilizing influence of rays from quartz lamp.

1,151,269. Electric Automatic Bowling Alley. D. E. Huntley and W. H. Bentine, Wellston, O. Pin-resetting mechanism with visual and audible signals for indicating the condition of the pins.

1,151,273. Contact Feeding Mechanism for Base-Making Machines. W. Jost, assignor to General Electric Co., Schenectady, N. Y. For manipulating the contacts entering into structure of lamp bases.

1,151,274. Cleaning Tool for Jack Contacts. W. Kaisling, assignor to Kellogg switchboard & Supply Co., Chicago, Ill. Adapted to enter within the jacks and thoroughly clean the contacts.

1,151,317 and 1,151,318. Method of Reproducing Intaglioprinting Surfaces. H. A. W. Wood, assignor to Wood & Nathan Co., New York, N. Y. First patent, printing surface is forced by electrodeposition of metal on negative mold. Second patent, modification.

1,151,319. Insulated Wire-Stripping Device. S. G. Wood, Brooklyn, N. Y. Specially constructed pliers.

1,151,345. Vapor Electric Device. W. W. Crawford, assignor to General Electric Co. Mercury-vapor lamp has specially formed tube having a vertical portion, the lower end being bent at an angle. Steadying of the arc is secured, no special vapor condensing means is required and the mercury is out of line with the arc in vertical portions of tube.

1,151,377. Light Unit. A. D. Nash, New York, N. Y. Lamp base is provided with extra threads for securing a decorative globe about lamp bulb. (See cut.)

1,151,380. Cable Clamp. J. E. Ogden, Mountainville, N. Y. For clamping cable to wall; also has bridle-ring extension.

1,151,395. Railway Safety Appliance. V. W. Owles and J. A. McKinley, Jr., New York, N. Y. Indicating devices on locomotive are selectively operated by sema-

No. 1,151,377.—Lamp With Globe.

phore along track according to its position.

1,151,390. Electrical Amusement Device. W. Prina, West Hoboken, N. J., and F. Prina, Jersey City, N. J. Board has lamps indicating players' positions on ball field, the lamps being successively lighted.

1,151,401. Double Reflecting Lamp. A. Rousch, Peekskill, N. Y. Special structure of tail light for automobiles for throwing light rearwardly and also downwardly on license plate.

1,151,403. Electric Heater. E. B. Ryce and W. Wallace, Louisiana, Mo. Arrangement of resistors and insulation in cylindrical device having insulating handle at one end.

1,151,419. Speed Controller for Aeroplanes. A. B. Thaw, Pittsburgh, Pa. Comprises automatic electrical control of the balance members by diving plane.

1,151,439. Electric Starter for Internal-Combustion Engines. B. Brooks and W. Holt, Birmingham, England. Gearing of motor to engine shaft automatically disconnected after starting.

1,151,453. Electric Storage Battery. B. Ford, Philadelphia, and J. L. Phillips, Haverford, Pa. Terminal post for securing to terminal pillar of battery plate.

1,151,479. Electric Door-Unlocking and Opening and Closing Means for Automobiles. K. W. Kurta, Scranton, Pa. Rear door normally disconnected from motor gearing can be geared to motor and latter operated to open and close door by push button within reach of chauffeur.

1,151,497. Mounting for Relays or the Like. E. A. Reinke, assignor to Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y. Relays supported on bar extending between and slidable upon I-beams.

1,151,516. Time Recorder. J. F. Engle, Cleveland, O. Electromagnetically operated device for printing time of day.

1,151,530. Motorcycle Lighting System. A. H. Neuland, assignor to Neuland Magneto Co., San Francisco, Cal. Special structure of magneto to maintain constant current in constant-resistance circuit through wide ranges of speed.

1,151,541. Calling Device for Automatic Telephone Exchanges. A. E. Keith, J. Erickson, and C. J. Erickson, assignors to First Trust & Savings Bank, Chicago, Ill. Arrangement for controlling circuit interrupter and release circuit by receiver hook.

1,151,542. Automatic Telephone-Exchange System. A. E. Keith, and T. G. Martin, assignors to First Trust & Savings Bank. Lockout arrangements for party lines in automatic common-battery system.

1,151,543. Telephone-Exchange Trunking System. A. E. Keith, assignor to Automatic Electric Co., Chicago, Ill. Arrangement and connections of automatic switch for connecting subscriber's line with idle trunk.

1,151,544. Non-Interfering Extension Party-Line Telephone System. T. G. Martin, assignor to First Trust & Savings Bank. In automatic system calls are sent through ground connections, attempted use of subscriber's instrument breaking its connection if line is in use.

1,151,545. Lockout for Extension or Party-Line Telephones. T. G. Martin and J. Erickson, assignors to First Trust & Savings Bank. Modification of above; making ground connection at any instrument disconnects all other instruments on line.

1,151,546. Automatic Common-Battery Party-Line Telephone System. T. G. Martin, assignor to First Trust & Savings Bank. Arrangement of automatic switch, lines, etc., with provision for non-interference.

1,151,547. Automatic Extension Telephone System. T. G. Martin, and F. Lubberger, assignors to First Trust & Savings Bank. Automatic trunking for line controlled from master or extension instrument; any extension may call master and be connected thereat with any other extension.

1,151,550. Motor-Starter. G. H. Whittingham, assignor to Monitor Controller Co., Baltimore, Md. Separate electromagnetically operated resistance-short-circuiting switches are separately restrained from closing if current is excessive.

Reissue 13,970. Electric Deposition of Metals by Fusion. A. P. Strohmenger, assignor to Slaughter & Co., Ltd., London, England. Original No. 1,073,543, dated Sept. 1, 1913. Structure and manipulation of electrode in arc brazing.

Patents Expired.

The following United States electrical patents expired on August 30, 1915:

609,851. Electric Locomotive. H. Van Hoevenbergh, New York, N. Y.

609,853. Railway Rail Joint. A. Vietor, Wiesbaden, Germany.

609,875. Electrode for Medical Purposes. M. N. Clarke, Wilkes-Barre, Pa.

609,877. Tension Regulator for Electrical Transmission of Speech. A. C. Cousens, Newark, N. J.

609,888. Clamp for Electric Wires. S. S. Leonard, Chicago, Ill.

609,924. Incandescent Lamp Shade or Cover. W. H. Wells, Brasher Falls, N. Y.

609,972. Hanger for Electric Lamps. W. F. Murphy, Iowa City, Ia.

609,977. Electric Railway Motor. A. Schmid, Pittsburgh, Pa.

609,990. Means for Controlling Non-synchronous Alternating-Current Motors. B. G. Lamme, Pittsburgh, Pa.

609,991. Method of and Means for Securing Constant Torque in Polyphase Motors. B. G. Lamme.

610,004. Rail Bond. W. H. Talley, Waco, Texas.

610,007. Contact Device for Electric Railways. L. E. Walkins, Springfield, Mass.

610,008. Contact-Rail Appliance for Electric Railways. L. E. Walkins.

610,009. Electric Railway. L. E. Walkins.

610,016. Electric Switch. R. A. Baldwin, South Norwalk, Conn.

610,023. Automatic Cutout for Magneto Generators. W. J. Bowen and C. A. Federer, Cleveland, O.

610,025. Alternating-Current Motor. C. S. Bradley, Avon, N. Y.

610,067. Induction Motor. B. G. Lamme, Pittsburgh, Pa.

610,077. Ship's Log and Registering Mechanism. W. H. McCurdy, Boston, Mass.

610,090. Electric Railroad. B. C. Seaton, St. Louis, Mo.

610,091. Third Rail for Electric Railways. B. C. Seaton.

610,092. Contact Device for Electric Railways. B. C. Seaton.

610,093. Third Rail for Electric Railways. B. C. Seaton.

610,094. Electric Railway. B. C. Seaton.

610,124. Controller for Electric Motors. H. P. Davis, Pittsburgh, Pa.

Electric Vehicle Section

Electric Vehicle Association of America Convention.

The plans for the sixth annual convention, which will be held in the Hotel Statler, Cleveland, Monday and Tuesday, October 18 and 19, are rapidly nearing completion. There was held in Cleveland on Thursday, August 19, a meeting which was attended by M. E. Turner, T. P. Cagwin, J. P. Lyons, representing M. R. Berry, H. N. Sibbald, M. H. Moffett, R. S. Dunning, secretary of the Cleveland Section, G. E. Miller and A. Jackson Marshall, executive secretary of the Electric Vehicle Association of America.

Transportation Committee.

H. N. Sibbald, chairman of the Transportation Committee, is planning desirable transportation for convention delegates. Mr. Sibbald, who may be addressed care National Lamp Works of the General Electric Company, Nela Park, Cleveland, Ohio, is desirous of hearing from all those who are likely to attend the convention as there is a possibility that special trains might be secured from New York, Chicago, St. Louis, and other points. Such facilities are not definitely promised, being contingent upon a required number of people traveling to Cleveland from any one or more points along the lines that a special train would travel. The special trains would add immeasurably to the comfort and convenience of convention delegates. Furthermore, they would assist in advertising the convention and electric vehicles generally. All those who would be interested in such service are urged to communicate with Mr. Sibbald.

Entertainment Committee.

G. E. Miller, chairman of the Entertainment Committee, reported progress. The entertainment program is as yet not complete and further announcements in this respect will be made later. In connection with the entertainment, it might be interesting to state at this point that in recognition of the great drain on business organizations of the "convention habit," the Association has decided to reduce its forthcoming convention at Cleveland to the lowest possible terms so that executives and other busy men having important interests at stake can gather its benefits with a minimum expenditure of time. To this end, the sessions will be run on efficiency lines and supplementary entertainments, such as form a conspicuous part of so many society gatherings, will be subordinated to business. The Transportation and Entertainment Committees contemplate providing transportation and guides for those delegates remaining over to Wednesday after the convention, which officially closes Tuesday night, so that they may visit the manufacturers' plants, show rooms, and points of interest in Cleveland. It is thought that a number of the attending delegates might want this opportunity and it is expected that their desires in this matter will be satisfied in an informal way at the close of the convention.

Exhibition Committee.

M. R. Berry, chairman of the Exhibition Committee, reported that there should be a strong demand for an exhibition of electric vehicle batteries, charging apparatus, measuring and registering instruments, tires, accessories, etc., and consequently tentative plans are under way to hold exhibitions at the Hotel Statler, the headquarters of the convention. It is expected that the exhibit will prove one of the most interesting features of the convention, attracting a large number of delegates who otherwise might not attend. It is a little too early to announce details in the development, but a statement will be forthcoming as soon as the Exhibition Committee has the work fully in hand.

Papers Committee.

George H. Jones, chairman of the Papers Committee, reports the following tentative and partial program developed to date:

"Industrial Trucks in the Service of the Pennsylvania Railway Company," by T. V. Buckwolter, Pennsylvania Railway Company.

"The Electric Taxicab," by I. S. Scrimger, secretary and general manager, Detroit Taxicab and Transfer Company.

"The Hartford Electric Company's Experience with the Battery-Maintenance and Battery-Exchange System," by Samuel Ferguson, vice-president, Hartford Electric Light Company.

"The Function of the Electric Garage," by R. Macrae, of the Commonwealth Edison Company, Chicago.

"Comparative Development of General Power and Commercial Electric Vehicle Loads and Function of Power Salesmen as Electric Vehicle Solicitors," by H. H. Holding, general car representative, and S. G. Thompson, general electric vehicle representative, Public Service Electric Company.

"Problems We Are Facing and How They May be Met," by George H. Kelly, secretary, Baker-Rauch & Lang Company and president, Electric Automobile Manufacturers' Association.

"Field for the Small Electric Delivery Vehicle," by Charles A. Ward, secretary-treasurer, Ward Motor Vehicle Company.

"Electric Vehicles in Municipal Service," by Arthur J. Slade, consulting engineer, New York City.

Electric Vehicle Association Handles Many Sales Prospects.

The Electric Vehicle Association of America is a clearing house for a great number of sales prospects secured not only from different points in the United States, but also from practically all foreign countries. When inquires for electric-vehicle information or other sales data is requested, same is satisfied immediately through the medium of letters and literature, and the information contained in these inquiries is placed on what is termed "Common" and "Preferred" prospect sheets and immediately mailed out to all manufacturers of electric vehicles, batteries, tires, accessories, industrial trucks, etc., which organizations supply inquirers with detailed and specific sales data. It is interesting to note as a partial result of the Association's extensive publicity campaigns conducted in many of the foreign countries that it is receiving a large number of excellent letters from almost all points in the world, seeking information about electric vehicles, and in many instances, indicating a desire to purchase some type or model. This is interesting because to many people the Electric Vehicle Association is regarded solely as a national body, whereas it is conducting quite an aggressive international campaign which is assisting the manufacturers in selling their commodities abroad.

Another Example of EDISON BATTERY RUGGEDNESS

One of the 36 Edison-Equipped Electric Delivery Wagons of the **Purity Baking Co., St. Paul,** recently left the roadway of a bridge, mounted the sidewalk, crashed through the iron side railing and plunged **100 FEET into the Mississippi.**

Some of the cans were considerably bent and dented and the wooden trays showed the effect of the fall but BEFORE ANY REPAIRS WHATEVER HAD BEEN MADE TO THE EDISON BATTERY IT WAS PUT ON "BENCH TEST" AND **EVERY CELL WAS WELL ABOVE RATED CAPACITY ON A NORMAL CHARGE.**

This indestructibility of the Edison Storage Battery permits its use in

Commercial Trucks
Industrial Trucks
Baggage Trucks
Mining Locomotives
Safety Mine Lamps
Railway Train Lighting
Heavy Duty Tractors

with no liability to mechanical injury.

Bulletin 1125 describes the manufacture of Edison Cells and many of their applications.

Bulletin 1023 shows why over 75 per cent of the Electrical Industrial Trucks and Tractors are equipped with Edison.

WRITE FOR BOTH.

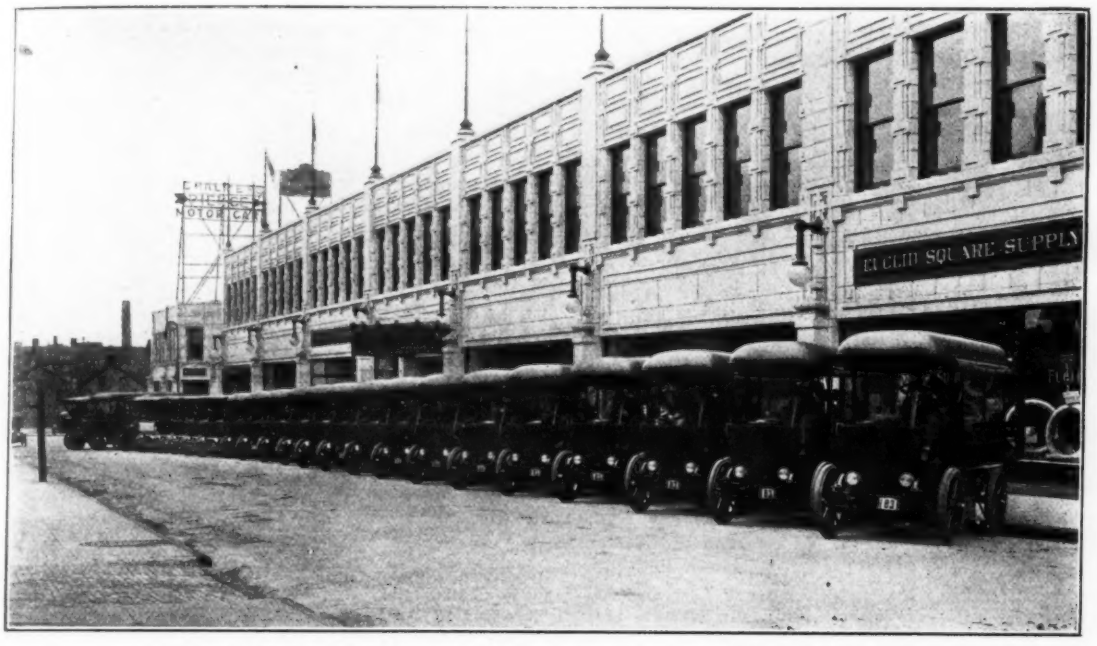
You cannot break the Jars, Plates or Separators of Edison Non-Acid Storage Batteries in service and they have passed practically unharmed through wrecks, collisions, fires, floods, cyclones, short-circuits and every other form of mechanical and electrical abuse.

EDISON STORAGE BATTERY COMPANY

Main Office and Factory, ORANGE, NEW JERSEY

Distributors in

New York Boston Chicago Detroit Washington
San Francisco Los Angeles Portland, Ore. Seattle



The "Electric" Fleet of The Delivery Co., Cleveland, Ohio

HERE is a photograph of a fleet of electric delivery wagons and trucks operated by The Delivery Company of Cleveland, Ohio. Every electric in this fleet is equipped with an "Ironclad-Exide" Battery.

During the month of November, 1913, which was the first month the Delivery Company operated these trucks, they averaged 41 miles per day and carried an average of 181 packages per car per day.

Here is a letter received from the above company a few months ago:

> *"We are pleased to advise, that we are using some twenty-three sets of your 'Ironclad' batteries in our delivery trucks in Cleveland. The service required of this equipment is rather severe, as we operate upon schedule time for the majority of the Department Stores, and our general delivery system, which serves some two hundred customers.*
>
> *"A mileage of from fifty to sixty miles per charge is not unusual for some of the longer routes and we find the 'Ironclad' battery rendering a very faithful performance, even under the severe road conditions of this City and after ten months' usage we are very glad to report entire satisfaction with their record."*

Electric vehicles equipped with "Ironclad-Exide" Batteries offer a dependable and economical delivery system.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride Accumulator" The "Tudor Accumulator"
The "Exide" "Hycap-Exide" "Thin-Exide" and "Ironclad-Exide" Batteries

New York, Boston, Chicago, Washington
Cleveland, Atlanta, Pittsburgh, Detroit

PHILADELPHIA, PA.
1888-1915

Denver, San Francisco, Seattle, St. Louis
Rochester, Los Angeles, Toronto

The Battery-Service System.

The General Vehicle Company has produced an interesting bulletin describing its Battery Service System, written by Frank B. Rae, Jr., editor of *Electrical Merchandise*. The following abstract will be found worth studying:

The Battery Service System is simply a method of selling electric motor car transportation by the car-mile instead of trying to sell electric current for battery charging by the kilowatt-hour. It is a method which relieves electric trucking of all uncertainty. Under the Battery Service System, the electric light man says to the merchant or manufacturer: "It will cost you so much per mile to operate this electric motor truck." That's all there is to it.

Boiled down, the proposition is this: The customer buys his electric wagon or truck without batteries. That saves him about 20 per cent to 25 per cent on his original investment. The lighting company owns and keeps ready for service a sufficient number of batteries to keep all the cars running all the time. When a battery is about exhausted, the customer brings his car to the garage for a "battery exchange" and in three minutes is on the street again with a fresh battery.

In a sense, it is like the modern milk delivery system. Years ago the milkman ladled out milk from the can into the family pitcher; today he delivers it in a company-owned bottle. Similarly, the common practice has been for an electric lighting company to deliver current to the customer's battery; the new system delivers the current "bottled" in a company-owned battery. In other words, the company is selling "canned" current instead of "loose" current.

The customer pays so much per mile for whatever distance his car travels, and he can travel as far as he wants to, using up the energy in several batteries a day if his business demands it. Thus there is no mileage limitation whatever placed upon any electric car that uses the Battery Service System. The customer has no reason to worry about hills, snow, mud or axle grease. All the uncertainty which exists in the layman's mind regarding the efficiency, life and care of batteries is also removed.

There is nothing philanthropic about the company's doing this; the Battery Service System is a business proposition in averages. The schedule of rates is figured as scientifically as a schedule of insurance rates, and upon the same principle. The element of chance or hazard is not a gamble, but is business risk reduced to a percentage basis. Without doubt, service is sometimes rendered at a loss, but then, insurance companies sometimes pay claims for thousands when they have received only a few dollars in premiums. Similarly a merchant averages his loss on a slow-moving line of goods against his profits on a quick turn-over; a manufacturer fixes his selling prices to take care of emergency items, such as broken machinery and spoilage; a street-car company averages long hauls against short hauls. With the Battery Service System the car-mile rate is based upon the average car-mile cost, with all the variables figured in. And because the electric light company is caring for and charging a great number of batteries under the expert supervision of specialists, in a garage and charging station wherein every possible facility for economy is provided, the car-mile rate they charge under the Battery Service System averages less through the year than the kilowatt-hour rate would come to, except in garages approximately as large and as well equipped.

The Battery Service System is not new. It has been in operation for two and one-half years in Hartford, Conn., and for shorter periods in other places. It is a success. If proof of this success were needed it is contained in the fact that Hartford is buying a car per year for each 7,000 of population, whereas the records show that a good general average of sales in cities which do not have a Battery Service System is a car to each 125,000 of population. Any proposition that results in 18 times the normal amouunt of sales may safely be termed successful. And another proof of success is that over half the electric vehicles purchased in Hartford have replaced gasoline cars.

The wide variety of service given under the System in Hartford is suggested by the reproduction of a full-page newspaper advertisement which the company printed in its local papers about a year ago. Here we find pictures of wagons and trucks used to handle coal, milk, groceries (wholesale and retail), ice cream, men's furnishings, baked goods, laundry and for general expressage and trucking. The cars sold have traveled 1,056,525 miles, to March 1, 1915.

Among the most interesting cases is that of a 2,000-pound wagon owned by W. F. Griswold, a dairy farmer located seven miles from the charging station. The following description of this machine and its work appeared in *The Motor Truck*.

"W. F. Griswold has a farm at Rocky Hill, seven miles distant. He has nearly 100 cows, and produces more than 1,000 quarts of milk daily, which is distributed by two routes in Hartford. The longest route was 25 miles, on which was delivered about 625 quarts of milk and cream, and serving this in the summer three horses were used, each making 25 miles for two days and resting the third day. In winter four horses were used, each pair working alternate days. On the other route the work was not as hard, and the animals could be worked fairly regularly in summer, and alternated in winter, as conditions required.

"Milk was delivered each day at the store of the Boston Branch Grocery, which operates the largest number of electric wagons in service in Hartford. After observing these for a considerable period, and learning of the Battery Service System, Mr. Griswold ordered a 2,000-pound wagon, which was delivered July 18, 1914. This machine has been operated each day since delivery, being driven by a son of the owner. * * * and each day at noon the battery is exchanged. The mileage at this season is approximately 25 a day.

"The young man serves 325 customers, which means that many stops. With a boy he leaves the farm at 6 o'clock, and is back by 1:30. A typical load was 22 cases of 12 quarts, 12 cases of 20 pints, in bottles, four 40-quart, one 30-quart and two 10-quart cans. This was a total of 594 quarts of milk and cream, weighing, with the containers, about 2,500 pounds. The wagon is driven under a shed at the farm, there not even being a garage.

"During the period of the year when the crops are harvested, the wagon is loaded with produce or fruit and makes a second trip to Hartford, this bringing the mileage for the extra trip days to 40 or 45, but during the winter the route alone is covered. The monthly mileage will range from 750 to 800 in winter and from 150 to 200 miles more in the warm weather. Since the electric wagon was purchased the number of horses used for the farm has been reduced from 16 to 10, so the machine can be regarded as practically replacing six of them. Since the wagon has been in use but one delay, for a half hour, has been experienced, and the driver says that he never could have done as well with animals."

This is but one example of many in Hartford. It is chosen because it represents hard operating conditions, as is evident from the figures—a route of 25 miles with 325 stops to be covered in seven and one-half hours—the wagon starting with 25 per cent overload and going its route for seven days a week with only a single half-hour delay within the first eight months. Contrast this hard, wearing service with the service or operating conditions of a wholesale grocer's truck, for example. It might travel but 25 miles, not in seven and one-half hours, but in 10 hours,

Heavy Duty Electrics

"General Vehicle"—of course

Heavy duty G. V. Trucks are used in over 90 lines of business. Some cover 60 miles per day, some but 12 miles. They pay on the longer city runs and they pay also in the mill yard where the hauls are not over 100 yards each. Adapting trucks to the ***individual needs of the user*** comes only through long experience. "Over 5,000 G. V. Electrics in service" explains why we seldom fail.

The Electric truck is not a competitor of the gasoline truck. Each has its economic field —the Electric for short haul frequent stop work, the gasoline truck for the long hauls with few stops.

In the city where heavy loads and frequent stops must contend with street congestion and waits at warehouses and terminals, the Electric is by far the most efficient, satisfactory and economical truck. Let us prove this to you.

Catalogue on request.

General Vehicle Company, Inc.

Long Island City, N.Y.

New York, Chicago, Boston, Philadelphia

Copyright, 1915

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over good city pavements and have to make only 100 stops. Obviously if a high-grade electric truck can beat out the horse on a milk route where operating conditions are abnormal, it can give the horse even a better run for its money on congested city streets. For the electric is at its best in the thick of the fight. The electric is more than a shunting engine, but it isn't a through freight engine. That honor falls to the gasoline truck. The trouble is that a lot of firms have been burning up money by using the through freight engine in the yard, namely, the city, forgetting that about 80 per cent of all the average city trucking can be done by the electric truck. That is, such work is in the field of the electric, and that being the case no other machine can do the work so well or so cheaply.

On February 14, 1912, there were 14 cars operating under the Battery Service System in Hartford; on January 1, 1914, the total increase was over 300 per cent, while January 1, 1915, showed a 50 per cent gain over 1914. Considering the size of Hartford, that is a record for continuous, uninterrupted vehicle success which is as yet unmatched anywhere in the world. Yet in half-a-dozen other cities where the system is now being established it seems probably that Hartford's wonderful record will be speedily overshadowed.

And why?

Simply because the Battery Service System removes the misunderstandings that heretofore have always existed between the man with goods to move and the man with current to sell. The removal of misunderstanding removes the troubles and disappointments which were caused by this misunderstanding. Under the new system, the electric light company provides what the customer wants—that is, electric transportation, measured in car-miles.

The Battery Service System removes every disadvantage to electric motor car transportation, and leaves only its advantages. As every man knows who has ever talked electric trucks to a prospective purchaser, the contra arguments are only four: (1) High first cost of vehicle. (2) Limited mileage on one battery charge. (3) Uncertainty as to efficiency, life and care of batteries. (4) Uncertainty as to actual cost of operating the car. The new system eliminates these arguments—wipes out these objections. (1) The vehicle minus battery is not high in cost. (2) Mileage under the Battery Service System is unlimited. (3) The battery and its troubles, if any, no longer concern the vehicle owner, but are of interest only to the lighting company. (4) The cost of operation is a fixed rate per car-mile.

So the whole proposition simmers down to a simple little question in arithmetc, thus: Find out how much it costs to deliver or truck goods under old methods; subtract the amount it would cost to do the same amount of work electrically under the schedule of the Battery Service System, and the difference between the two amounts is the net saving effected by the truck owner.

"But what if there is no saving?" asks the skeptical man.

Then study the figures and find what has been left out of the costs under the old method. If *all* the costs are figured in, the chances are about 100 to 1 that trouble-proof trucking by electricity shows a definite economy in dollars and cents, and this without taking into consideration such items as:

Reliability. Flexibility. Cleanliness. Ability to operate in both blizzard and heat. Capacity to handle occasional heavy overload.

The man who sells—or the man who buys—electric transportation under the Battery Service System is dealing in proven figures, not in estimates. He is dealing with definite facts, not in arguments. And that is another advantage of the system—it saves a lot of talk.

Chicago Section, Electric Vehicle Association to Hold Annual Meeting October 5.

The annual meeting of the Chicago Section of the Electric Vehicle Association of America will be held on October 5. The first meeting of the fall and winter season of 1915-1916 will be held on September 7, at the Metropole Hotel, 2300 Michigan Avenue.

In connection with the work of the Chicago Section, the secretary of the Electric Vehicle Association of America has made the following announcement: "The General Office of the Association desires to express publicly in this manner its very great appreciation for the practical work of great value which the Chicago Section is accomplishing in the matter of their so-called parking system whereby users of electric vehicles may leave their vehicles at the Electric Shop of the Commonwealth Edison Company where uniformed, licensed chauffeurs take them to the park and return them whenever ordered. This co-operative service has done as much, if not more than any one single thing to emphasize the practical value of a local section of the Association, because the service, much desired, is being extended under the auspices of the Chicago Section. It is expected that other cities, and especially those cities in which the Association has its 16 sections, where city ordinances deny the privilege of cars standing stationary for any length of time at the curb in the city streets, will develop some such scheme as being successfully carried out in Chicago. F. E. McCall, secretary of the Chicago Section, of the Commonwealth Edison Company, 120 West Adams Street, Chicago, Ill., is preparing a detailed outline of the methods employed in the extension of this service and same will be released by the General Office of the Association to all other section secretaries. In the meantime it is felt that Mr. McCall would gladly satisfy any request for information in this work."

Electric Makes Fifteen Hundred Miles in Fourteen Days.

Over 1,500 miles in 14 days is a recent performance of an electric. This record in electric-vehicle efficiency was made in the recent endurance test held by the Beardsley Electric Company, of Los Angeles, Cal. Mrs. Volney Beardsley, wife of the president of the company, volunteered to drive the car for the first 10 days, being accompanied each day by different women representing the press and acting as observers. During the last four days the car was driven by owners of Beardsley electrics, to further demonstrate the possibilities of an electric when driven by any careful operator. Mrs. Beardsley timed her days so successfully that in no case did the daily run fall below 100 miles, the average daily mileage being 106.6.

On the tenth day, when she believed the test was coming to an end, she decided to make the longest record of the 10 days, and registered 117 miles. In each case the day's run was made on a single charge of the batteries. The last four days increased the average to 107.5 miles per day, or a total of 1,505.6 miles covered in 14 days.

As to the battery efficiency, the owners themselves were not sure at the beginning whether the batteries, after being practically exhausted on 100-mile run each day, could be charged over night, ready to repeat the performance the following day. They proved, however, that this could be done, not only for a second day, but for a steady two weeks' grind, and upon examination of the batteries at the completion of this 1,500-mile run, the plates were in excellent condition, showing that the car was probably capable of keeping up this same average for a long time. The runs were made over all kinds of California roads, covering different routes, the greater part of which were country runs over hilly ground.

Books on Electric Vehicles

"The Electric Vehicle Hand-Book"

By H. C. Cushing, Jr. and Frank W. Smith

Fellow Am. Inst. Elec. Engrs., Publisher of "The Central Station," the official organ of the Electric Vehicle Association of America. President Electric Vehicle Association of America and Vice Pres. United Electric Light & Power Co., New York.

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IV.—Commercial Types of Lead Storage Batteries.
V.—Alkaline Storage Batteries; Description and Care.
VI.—Charging Apparatus and Charging Stations; Alternating Current Apparatus; Isolated Plants.
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EDUCATIONAL VALUE OF SOCIABILITY RUNS.

By A. Jackson Marshall.[1]

When we hear repeatedly of the many successful tests made of the endurance and country-running ability of the electric vehicle by various manufacturers, we must conclude definitely that the use of an electric is no longer confined to city streets and boulevards. We have so long been accustomed to thinking of the electric as the town car, par excellence, that it has not occurred to us that it will give just as delightful and satisfactory service on rural trips in this day, when charging facilities have become so well developed and numerous. While it will always remain the favorite car for city use, the electric in time will become just as great a favorite for interurban trips and short tours. It is a matter of educating the owners of electrics to operate their cars with greater reliance and to make wider and more general use of them. Such series of runs as the Anderson Electric Car Company carried on not long ago in Detroit when one of its stock model broughams made as much as 112 miles on a single battery charge, and the recent endurance runs conducted by the Beardsley Electric Company, of Los Angeles, Cal., when the car registered over 1,500 miles in 14 days, show that there should be no doubts about the electric's ability to cover ground. The solution of the problem of getting electric owners to use their cars more extensively lies in the Sociability Run.

There is nothing new about the idea. It has been tried sporadically for a number of years, but the time has come for a more systematic and continuous effort to introduce them into all parts of the country. The problem of organizing such runs in cities where the number of electrics warrant such a performance is being met and solved by various sections of the Electric Vehicle Association of America. With an organization of live and progressive men to start the ball rolling and the co-operation of electricity supply stations, manufacturers, garages and owners themselves, everything should conspire to make the runs a success.

In emphasizing Sociability Runs, the writer does not mean to recommend stunts in the nature of mileage test runs, speed contests and the long cross-country tours. These are all variations of the Sociability Run, and have this advertising value, but are not so educational as where the owners themselves take part. When the owners of electrics and their friends participate they not only learn the advantages and capabilities of the electric, but they also familiarize themselves with traffic regulations while passing through town and city streets on their way to the country districts.

In anticipation of Electrical Prosperity Week, scheduled for November 29 to December 4, 1915, the Electric Vehicle Association of America has gathered together various data on how to organize and conduct Sociability Runs. It is the firm conviction of the Association that the introduction of such runs is the very best way to educate the public in the country-running ability of the electric and dispel the idea that it is necessarily a car for city streets only. It is hoped that many runs of this nature will be organized during Electrical Prosperity Week, and that the results will be far-reaching in breaking down existing prejudice.

The following suggestions for conducting runs are based on the experiences that several sections of the Electric Vehicle Association have had in successfully organizing them, especially the Washington Section, whose runs have met with great popularity and success. In cities where the Association has a section it has not been found necessary to have a special committee to handle the work, the run being managed by members of the main Executive Committee—those members who are car dealers taking the most active part. The preliminary work to be done is divided up and consists in making provision for the following: Pennants, badges for committee, prizes, refreshments, and the selection of the route. The entries are made by individual owners, no dealer being allowed to enter his car in competition.

To cover the expenses of the run an entry fee is charged—$1 for cars carrying one or two passengers, and $2 for cars carrying three or four passengers. Subscriptions of from $5 to $15 are solicited from central stations, garages, car dealers, battery manufacturers, etc., to cover other expenses.

One of the most successful features of the Washington Sociability Run was the arrangement made for luncheon. Instead of serving the party at an inn, each car was provided with a luncheon box put up by the best and most fashionable caterer in Washington, and at the finish the participants forming their own groups voted the appetizing luncheons one of the most enjoyable parts of the run.

The prizes were bought from one of the leading jewelers, and while after the first two or three prizes the remaining were necessarily small, they were the best of their kind obtainable.

As a great many of the entrants are usually women, it is considered wiser not to have any contest that would test the skill of the drivers, and contests bringing out any one feature of a car are apt to result in unfavorable comparisons being made for cars not competing. In the Washington runs it was considered that the route selected should not take materially over an hour to negotiate, and any entrant who was unable to complete the route in an hour and one-half was disqualified. The only competition was against average time made by all contestants completing the run within the time limit; that is, instead of having a sealed time, as is so often done in Sociability Runs, the total elapsed time of all cars completing the run within the time limit was added and divided by the number of entries. The car making the nearest to this time was awarded the first prize.

The Association will be glad to furnish any further details on the organization of Sociability Runs. It is the sincere desire to encourage in every possible way a systematized organization of runs, such as will show the public that for any average country run or week-end trip the electric is entirely capable.

[1] Secretary, Electric Vehicle Association of America, 29 West Thirty-ninth Street, New York.

Florida Motorist Suggests Road Rules for Lincoln Highway.

Evidently the road rules in the Everglade State are not favorable to the motorist. At least the tourist who sent in the following suggestions to the Lincoln Highway Association as rules of the road to be observed by the thousands of transcontinental tourists of this summer, has had some bitter recollections.

Upon close inspection it will be seen that a gentle vein of satire pervades the suggested list. The motorist says that they are the general rules which must be observed about Jacksonville, and, if they are successful and popular there, why not along the Lincoln Highway?

Rule 1—Upon discovering an approaching team, the automobilist must draw to one side of the road and cover up his machine with a tarpaulin painted to correspond with the scenery.

Rule 2—The speed limit on country roads this year will be secret, and the penalty for violation will be $10 for every mile an offender is caught going in excess of it.

Rule 3—On approaching a corner, the automobilist must stop not less than 100 yards from the turn and the mechanician must be sent ahead to blow a horn, ring a bell, fire a revolver and send up three rockets at intervals of five minutes.

Rule 4—Automobiles running at night must send up a red rocket every mile and then wait ten minutes for the road to clear. They may then proceed carefully, blowing their horns and shooting Roman candles.

Rule 5—In case a horse will not pass an automobile in spite of the tarpaulin, the automobilist will take the machine apart as rapidly as possible and conceal the parts in the grass.